PRINCIPLES of COOKERY

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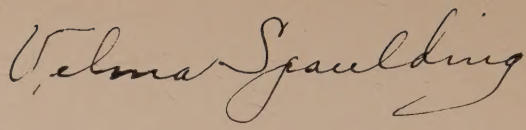

Principles of Cookery

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CHICAGO
AMERICAN SCHOOL OF HOME ECONOMICS
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AMERICAN SCHOOL OF HOME ECONOMICS

CHICAGO

January 1, 1907.

My dear Madam:

Cookery is so old a story to many women that they find little interest in it. Others, though they enjoy cooking and are constantly devising new ways of preparing food and seeking new recipes from their friends, never learn anything of the chemical composition of foods or the reasons for the processes they carry on daily.

Comparatively few have yet studied cookery as they study other subjects, getting at its fundamental principles and grouping its varied formulas in a few general divisions.

In these lessons the attempt has been made to reduce cookery to its lowest terms. It would be impossible to tell the whole story of the art of cookery in so few pages, but by concentrating we are better able to view the subject as a whole. The aim has been to lay a foundation with which each student may become familiar easily and upon which she may build a system of cookery in accord with modern scientific investigation and yet adapted to her own conditions.

For those who have had little or no experience in cooking, the order in which the topics are taken up will be suggestive and helpful--that is, the application of heat to foods, the use of water in cooking, cooking of simple foods as grains, vegetables, and meats, and last, the mixing and cooking of doughs and the making of the more complicated dishes. If possible, all the experiments should be performed, especially when

they are called for in the test questions. Keeping a note book will be found a great help in fixing experiences in mind and in preventing a repetition of mistakes.

Most of our present system of cookery has been derived from the experiments of the generations of housekeepers behind us, but there is no reason why the housekeeper or cook of to-day should cling to the traditions of the past if she can devise a better way. It is hoped that these lessons may induce each student to observe, to adapt, to experiment. New life is put into the simplest routine of daily work if we are constantly watching processes and studying short cuts to better results.

Very sincerely yours,

Anna Barrows.

Instructor

PRINCIPLES OF COOKERY

A NATURAL starting point in the art of cookery is the fire, since cookery without heat is an impossibility. Human beings everywhere use fire to prepare their foods and by such applications of heat man first showed his superiority to the beasts.

FIRE

Among the ancients fire was regarded as a gift from the gods, to be protected in every way, and all civilization, forms of religion, civil ordinances, and family life have been traced to the care primitive man bestowed upon his fire. Among the early tribes, the chieftain was often the only one to have a fire in his home. The hearthstone thus became the center of the home life, the abode of the household gods, and even at the present time it is impossible for some persons to separate the spirit of the home from the kitchen fire.

Ancient Stoves

In different sections of the country may still be seen all the types of fire and stove that have been developed through centuries, and every housekeeper should be familiar with the principles underlying the care of each. Among these are the camp fire where food is broiled over coals or buried in hot ashes, the charcoal brazier of the fruit vender, essentially the same as the portable stoves found in Pompeii, the open fireplace, the brick oven, the Franklin stove, (an in-

vention of Benjamin Franklin), cookstoves adapted to wood, to hard and soft coal, to kerosene, to gas, and the electrical appliances which as yet are little more than toys for the rich.

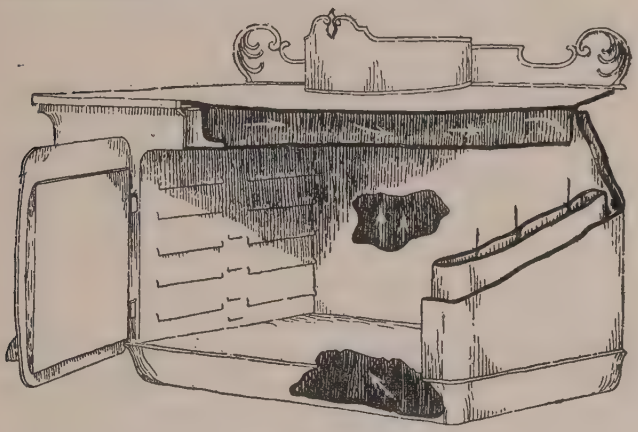
A Roman Stove or Brazier.

A century and more ago chimneys and fireplaces were often troublesome by smoking and Count Rumford and Benjamin Franklin each in different ways brought their inventive faculties to the solution of this serious problem of daily life. When the fireplace was the dependence of the home for warmth and cooking, the charred, half-burned brands of wood were carefully covered with ashes at night to start the fire the next morning. If the wind had blown off the ashes and the coals were gone out, it was easier to borrow more coals from a neighbor than to use the flint to produce a spark. All this was changed when matches were invented.

First Ovens

It was but a step for primitive man from baking in hot ashes or in a covered kettle set on the coals to a simple form of oven. Often one oven served a community. Brick ovens were built at one side of the chimney. Sometimes the heat was turned through a flue to heat these ovens, sometimes a fire was built directly in the oven, and when it was burned down the oven was swept out and the food put in to be cooked

by the heated bricks. The later brick ovens, still used in some old houses, often had space underneath for a separate fire.



An Oven, Showing Direction of the Hot Gases.

Wood as Fuel

For the open fire, wood is the most satisfactory fuel but it is not desirable for continuous use in cooking or heating. Wood is sold by measure, which is an inaccurate method at best. The drier the wood the better it burns, and a hard wood which produces coals is most useful.

When wood is heated and the volatile portions expelled, charcoal is produced. This is usually sold by measure. Its weight is about one-fifth that of the wood from which it is made. It is a primitive form of fuel and generally used in warm countries. A succession of small fires which can be quickly lighted and as

quickly extinguished are more suitable to such conditions than the one large stove or range.

The small stoves used today by the Latin races and their colonies do not differ materially from those of the early Romans.

Charcoal

The charcoal broiler is used by many hotels because of the flavor it appears to develop in meats.

Peat is an important fuel in some sections of the world. It must be thoroughly drained or dried, and at best contains a large percentage of ash.

Both anthracite and bituminous coal have been in common use for less than a hundred years.

Hard Coal

A dense solid, like hard coal, kindles slowly but requires far less care to maintain a fire than wood. Coal is a better fuel for winter than summer. If the lumps of coal are too large they will not kindle readily; if too small, they choke the flame. The large nut and egg grades are best suited to cooking purposes. The draft and size of the fire box determine the size and grade to be used for good results. The free burning "Franklin" coal should be used with poor draft, while with a good draft and large fire box all grades and the larger sizes may be used. A dark brilliant coal will have fewest clinkers. The intense heat resulting from open drafts fuses in large masses the foreign matter which is mixed with the carbon. By burning oyster shells in such cases, new compounds are formed which prevent the clinkers, but the clinkers seldom form with a moderate supply of air.

Soft coal needs very different treatment from hard. Little draft underneath is required, but some draft is necessary over the top to burn the gases given off, and the funnel draft must be open to allow the smoke to escape. If the coal has "coked" over on top it must be broken up when good fire is required. If the fire is to be kept, it is allowed to coke over. **Soft Coal**

Briquettes are made from coal dust and other substances and are used extensively in places where coal is high priced.

The wood and coal stoves and ranges are today the most common means of cooking foods. Housekeepers often become familiar with one stove and one kind of fuel and are unsuccessful with another because they are unwilling to study the laws of nature, or lack the patience to experiment with a new adaptation of them. **Stoves and Ranges**

Much besides personal preference must be considered in the proper valuation of fuels; not only the percentage of carbon, moisture, and volatile matter in each, but the necessary waste, the by-products, and the time required for caring for each and keeping the surroundings clean.

The best stoves and ranges are those plain in finish and simple in construction, with parts well fitted together so that they can be taken apart if necessary and easily cleaned.

A portable range is one that may be moved if necessary, while the "set" range is built into the chimney.

The fire box is lined on the sides with a kind of brick **Fire-Box**

above which the fire should never come. The revolving grate is the most common in recent styles of stoves. There is a grate underneath, and below is a place for ashes or a pan which may be taken out to empty. The oven is surrounded by spaces through which hot gases circulate.

The housekeeper should investigate her stove thoroughly when the fire is out, take off all covers, open doors, remove the "clean out" plate for the space under the oven; then see how the dampers work and explore all passages with a lighted match or candle if need be.

The Draft

The draft given by the chimney depends upon the difference in temperature between the air of the room and the gases of combustion. The hot gases are more expanded and therefore lighter and tend to rise. The hotter the fire the greater the draft will be.

The supply of air is as essential as fuel for a good fire; combustion depends upon both. Smoke and an accumulation of soot are indications of incomplete combustion.

Several drafts and dampers are common to all wood and coal stoves and ranges. They should be open to start the fire, but closed to keep it. The slide under the fire box supplies the fresh air necessary for perfect combustion. A check in the pipe or at the back of the stove under the pipe, or in both places, is usually known as the chimney damper. A slide in the stove pipe or connected with the chimney damper admits cold air into the stove pipe when opened and thus lessens the draft.

Oven Damper

The oven damper turns the heated air away from the pipe so that it goes over the top, down the side, under the bottom, and up the back flue in most stoves and heats the oven before it makes its escape. These differ slightly in different ranges but the purpose of each is the same. Experiment with your own stove until you can control it.

Many ranges have a slide or door above the fire box which may be used for broiling. Hoods are sometimes placed over large ranges to gather odors and excessive heat and convey them to the chimney.

Kindling the Fire

Whether the fuel be coal or wood, the starting of a fire and its care afterwards are much the same process. First remove ashes, brushing off the top of the oven under the covers. When the fire box is clear, put in crumpled paper, bits of wood, and then larger wood and a sprinkle of fine coal. See that all drafts are open. Replace the covers and then blacken the stove, if necessary, but polish after the fire is started. Light the paper and as the wood settles down, add coal, little by little, till it is even with the lining of the fire box. When the blue flame of coal disappears, close the oven damper, and a little later shut the slide under the fire box and the chimney damper. Open the damper when more coal is added. When coal is red it is nearly burned out.

To keep a fire several hours shake out the ashes, fill with coal, close the dampers, and partially open the slide above the fire.

For continual use it is better to add a little fuel at a time, but not in the midst of baking anything. With wood and soft coal the chimney damper cannot be closed as much as with hard coal, because there is more soot and smoke which must be allowed to escape.

Gas is an invisible fuel obtained from several sources. Pure coal gas is more satisfactory than natural gas, or than the so-called "water gas." The escape of the latter is less easily detected and it is much more poisonous, hence there is more danger in using it.

Bunsen Burner.

For institutions at a distance from large towns a private supply of gas which is fairly satisfactory is made from gasoline, and acetylene gas is now often made even for the single house.

Gas Burners

For fuel purposes, the burners are so constructed as to admit sufficient air with the gas for complete combustion. A bluish flame is produced, which is much hotter than the yellow blaze used for light.

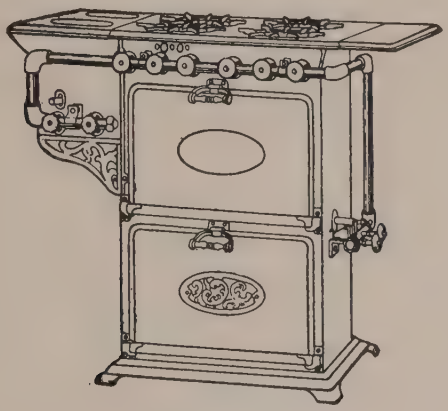
It is possible to admit too much air, which causes a loss of heat. If the air supply is adjustable, close the opening for the air until a yellow flame is produced, and then open it until the flame just comes blue again.

If a burner in a gas stove "burns back" and shows a

yellowish flame, leaving a deposit of soot on the bottom of kettles, turn it out and light it again, being careful that the gas does not ignite back in the pipe before it mixes with the air.

Gas stoves should be connected with the main supply by a pipe large enough to insure sufficient supply of

Gas Stoves



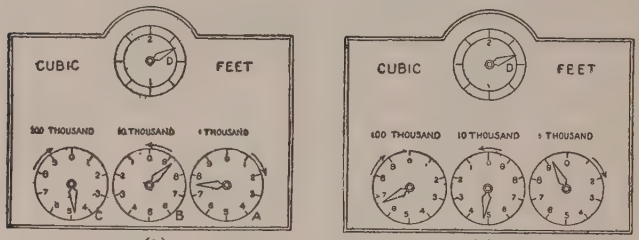
Gas Stove with Oven, Broiler, and Hot Water Heater Attachment.

fuel under all conditions. The amount used can then be regulated by the cook for each burner. Care must be taken to keep the burners and all parts of the stove perfectly clean.

The gas stove is especially adapted to the conditions of the present age; it is far less care than either wood or coal ranges, and at ordinary rates for gas, less expensive when properly operated. Even at high prices

Adva
of Ge
Stove

for gas it is a cheap fuel if human energy and time are considered. The application of a match makes the full power of the stove available at once and as soon as work is done, the flame may be shut off. Any desired degree of heat may be obtained at short notice with no waste of fuel and no debris to be cared for. The stoves occupy small space and each part may be used independently.



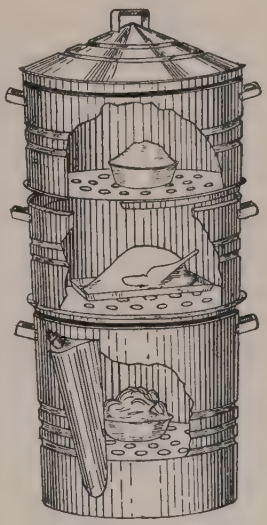
Dial of a Gas Meter, (a) At the Beginning of a Month, (b) After Registering the Amount of Gas Used for the Month.

Gas Meter

The housekeeper should learn to read a gas meter. Each space on the right hand circle passed by the hand indicates the consumption of 100 cubic feet of gas, on the middle circle 1,000 feet, and on the one on the left hand 10,000 feet. Read from left to right, taking the figure just passed by each hand and add two ciphers for the hundreds. A previous reading deducted from the present one shows the amount of gas consumed in a given time.

Example. In the illustration, the hand on dial A has just passed the figure 7, indicating 700 cubic feet; on dial B the hand has passed figure 8 (note that this

hand moves in the opposite direction to the first), and on dial C the hand has last passed the figure 4. The reading is then, 700+8,000+40,000=48,700 cubic feet. If in a month the hands are in the position indicated in the second figure, the reading is 64,900 cubic feet. The difference between the two readings is 64,900—48,700=16,200 cubic feet. Sixteen thousand two hundred cubic feet is the amount consumed for the month.



Steam Cooker, Circular Form.

The small dial at the top of the illustration indicates cubic feet and is used only for testing the system for leakage.

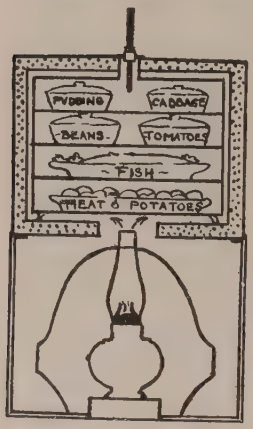
Kerosene and gasoline are useful fuels for summer and emergency use. These are sold by the gallon and only the best qualities should be used. The blue flame kerosene probably are the best of this class of stoves. The small lamp stoves also have merit. They are similar in construction to reading lamps and should receive equal care. Two small stoves often are more useful than one large one, because more readily moved where needed. It is essential that such stoves should stand out of a draft.

Kerosene and Gasoline

Steam Cooker

A steam cooker is an invaluable adjunct to the small stoves whether gas or kerosene is burned. Several articles may thus be cooked over one burner and both time and fuel are saved.

The Aladdin oven is an arrangement for saving heat. It may be used with an ordinary large lamp or with gas. The iron oven is placed inside a jacket of non-conducting substance, hence little heat is lost. It is especially useful for slow cooking.



Aladdin Oven Heated by Lamp.

The Norwegian cooking box is another plan for saving heat. A kettle of food is raised to the boiling point and then packed in a box lined with non-conducting materials.

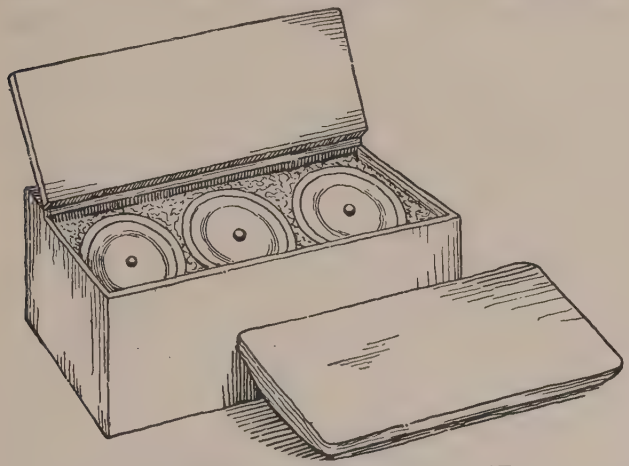
Chafing Dish

The modern chafing dish is but slightly different in effect from the primitive charcoal stove or brazier. The use of alcohol for fuel makes it simple and clean. Wood alcohol—a by-product from distillation of wood—is often used for fuel, but its disagreeable odor makes it less desirable.

Anything that may be cooked over any other stove in a frypan, saucepan, or double boiler may be prepared in the chafing dish.

Effects of Cooking

Heat brings out the flavors in food and develops new ones and makes soluble, substances which the human stomach could not otherwise digest. In most cases moderate heat long continued produces better results than intense heat applied for a short period.



A MODIFIED NORWEGIAN COOKING BOX.

Graniteware Pails with tight covers are packed with asbestos and covered with a pad, the lid of the box is then closed and the whole wrapped in an old blanket.

The degree of heat best adapted to make food digestible is not always that which produces the most acceptable flavor, hence cooking must be more or less of a compromise. As yet we know little about the degree of heat best suited to the perfect cooking of each food and the temperature at which it should be served.

Nothing will cook until it is warmed, and warming and drying are usually the first steps in the cooking process.

Transmission of Heat

The transmission of heat from a fire to our foods may be by conduction, as when heat travels along a bar of metal, by convection, when heat is transferred by the motion of heated liquid or gas, and by radiation through the air. The effect of heat on the food is further modified by the way the metal or other substance containing the food is affected by heat.

The use of asbestos in the form of mats and linings for ovens and jackets for kettles to modify the heat transferred to food is likely to increase in the future.

Boiling

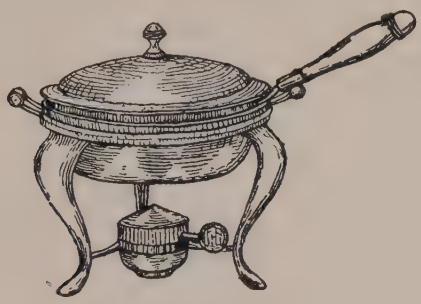
Broiling probably was the first attempt at cooking since it required little beside the fire and the heat. Roasting is a similar process applied to larger sections of meat and therefore requiring a longer time. The relationship of roasting and broiling is most apparent with a gas range for there is no line of separation between the cooking of thick steaks and thin roasts. Much so-called roasting is really baking.

Roasting

In broiling and roasting, tender portions of fish, flesh or fowls are exposed to intense heat at first to sear the outside and close the open tubes or pores which contain the juices. The fire should be free from smoke and may be charcoal or half-burned wood or coal or gas. After the surface is browned the section of meat should be drawn away from the intense heat and kept at a more moderate temperature until cooked thoroughly. More depends upon the shape of the article to be broiled or roasted than upon the weight.

When a thick mass is to be cooked in this fashion it

becomes necessary to modify the heat on the outside and to aid in driving it in by the process known as basting; that is, dipping up the hot fat which has dripped into a pan beneath the meat and hence is known as dripping, and pouring it over the outside of the mass. The glossy brown secured by basting may have suggested to some early cook the advantage of deep frying. Basting



Chafing-Dish—the Modern Brazier.

The difference between broiling over coals and in a hot pan is but slight and dry frying or sautering is a similar process. Toasting is a similar application of heat to foods already cooked once.

The earliest forms of baking were in the hot dishes and then in covered kettles set in coals or hung over the fire. Our ovens are an outgrowth from those primitive methods, and now much so-called roasting is really baking.

A point to study in this connection is the fact that food is fuel for the human body. The amount and

quality of fuel is varied according to the work to be done, so should the food be chosen according to the work of the individual and the climate or season of the year.

WATER

Water is not always considered to be strictly a food in itself, but by its aid many foods and flavors are put in forms more acceptable to the palate and more readily absorbed by the body than they could be in any other way.

Importance of Water in Cooking

Immense quantities of water are necessary for the preparation of food and the cleansing of dishes in addition to what is needed for laundry and bathing purposes. Cities make provision from some source safe from contamination for the water needed by their inhabitants. In small communities the individual family must each be responsible for its water supply. This is not the place to discuss the medical aspect of the water question, but all agree that water should be above the suspicion of danger of transmitting disease. Moreover, for household purposes water should be clean and soft, since hard water containing mineral salts hinders processes of cooking and cleaning.

A limited water supply or inconvenient arrangements for its use and disposal afterward, tend to reduce the consumption to such an extent as to interfere with the proper cooking and service of food, if not below the actual standards for health.

Nearly three-fourths of the human body is water and a similar proportion will hold in most foods served at our tables. The total amount of water taken by a human being daily averages two or three quarts, or from four to six pounds. The portion of this which is taken as a beverage depends upon the solidity of the food.

Mineral Water

The benefit gained from mineral waters often is quite as much due to an increased consumption of water as to the mineral constituents they contain. The tendency of civilized man in feeding himself is toward too concentrated foods, too little water as a beverage and too little watery food. Water not only brings solids into the stomach in an acceptable form, but it is essential in building new tissues and removing wastes. The inside of the body, as well as the outside, sometimes requires washing.

The temperature at which water is taken into the stomach is an important point. A glass of cool water sipped slowly may have as stimulating an effect as one of wine. Often more ice than water is found in the glasses on American tables, and the ice water is taken hurriedly and interferes with digestion.

Hot water taken slowly will often revive tired people as effectually as tea or coffee. The merit of soup as a first course at dinner probably is due to the fact that it contains ninety to ninety-five per cent hot water and that the solids are largely in solution and absorbable.

If clear hot water is an unpalatable beverage, salt or lemon juice may be added to give a distinct flavor.

Flavor of Water

There is a marked difference in flavor between water freshly boiled and that which has been kept hot for a long time. The latter has lost the gases which give life to fresh water. For any purpose in cooking stale water will injure the flavor of foods whether it be taken from a hot water faucet or from a teakettle where it has stood for hours.

Other ill flavors come into our foods because of imperfect utensils, badly washed. A rough surface or seam will retain something from previous cooking to add to the next substance cooked therein, or greasy dishwater or soap may be left in sufficient quantity to give an appreciable change of flavor.

Another important use of water essential in good cooking is for the cleaning of utensils.

Dishwashing

Dishwashing is not a popular occupation probably because repairing or setting to rights is never quite as interesting as the construction of something definite. Insufficient appliances and inconvenient conditions for the work are other causes for its unpopularity.

With a convenient sink of the right height, ample table room for soiled and clean dishes, abundance of towels and hot water, dishwashing loses its terrors.

A knowledge of the composition of each food and the way it is affected by different degrees of heat is as desirable in dishwashing as in cooking. For example, where gelatine has dried on a strainer it should be

softened in cold water, but that treatment would not be helpful if the strainer had been used for fry fat, while an egg beater plunged in boiling water would be all the harder to wash because the egg would be cooked. Time is saved by careful sorting and scraping of dishes before washing. Detergents are helpful but less important than abundance of water.

Soaking Dishes

Strong soda water boiled in a utensil will remove food that has burned on. Soaking is as helpful in dishwashing as in the laundry and dishes that cannot be washed as soon as used should be covered with water. After washing, any dishes are improved by rinsing in scalding water.

The usual plan is to wash dishes in this order, glass, silver, crockery, cooking pans, or kettles. Often it is more desirable to get the large pieces out of the way first.

It is half a century since the first dishwashing machine was invented and though they are in general use for hotels, hand work seems better adapted to most households.

To illustrate the effect of the range of temperature from the block of ice at 32° F to the steaming kettle at 212° F let us follow the process of making a simple gelatine jelly. The gelatine has been extracted for us in factories from bones of animals and needs no cooking, but must be dissolved and combined with liquid and flavoring. It is first softened in cold water, the time required varying according to the size of the parti-

cles of gelatine. Then it must be dissolved with boiling liquid. Use only as much boiling liquid as is necessary to dissolve the gelatine. The sugar, if that is to be used, added next, because it will dissolve more rapidly in a warm medium, and then is put in the fruit juice or whatever is to flavor the jelly.

Gelatine Jelly

The compound is to be strained and cooled. The larger the mass the slower the cooling.

Experiment. To illustrate this put half the jelly in one mould and the other half in several cups. The cup will be firm before the large mould at any temperature.

To illustrate another point put one cup in a pan of snow or cracked ice mixed with coarse salt. When some of the jelly is half thickened combine with it whipped cream or white of egg.

If possible take temperature of each with a thermometer. The key to all gelatine desserts, is to have proper proportions of gelatine and liquid and to have the right temperature for the different stages. The proportions are given by each manufacturer on the package.

METHODS OF COOKING IN WATER.

Water is as essential as fire in all processes of cookery. No food can be cooked without water and unless it naturally contains a large proportion of the fluid, more must be added during the cooking process.

Boiling

Cooking food *in* water indicates further progress in

this art than either broiling or roasting. It implies the invention of a kettle to contain the water, though the earliest cooking of this sort may have been done by dropping heated stones into a hollow one containing the water and meat or into a water tight basket. Homer and other ancient writers have nothing to say about boiled meats, though they mention those which were broiled or roasted.

Boiling, stewing, and steaming are slight variations of the same process. Under ordinary conditions, without pressure, no food thus cooked can be raised to a higher temperature than 212° F at sea level, and at high altitudes few foods can be cooked in this way, since water boils at a lower temperature.

Experiment. Much may be learned by heating a given measure of water and watching it until it reaches the boiling point.

Tiny bubbles hardly larger than the point of a pin soon form and rise to the top, but this is not boiling. The same thing may happen in a glass of water standing for an hour on the table. How will you explain this?

When the water is actually boiling large bubbles rise rapidly and break on the surface. Keep up this process until nothing appears to be left in the pan. Where has the water gone? Has anything been left behind? There will usually be a trace of coloring matter to indicate that solids do not evaporate.

This point may be made more apparent by putting a

tablespoonful of salt in the water that is to be evaporated.

What is left behind in a teakettle which is never cleaned inside though the water is allowed to boil day after day?

Evaporation

Experiment. Other simple experiments may be made with two dishes of uniform size containing the same amount of water exposed to the same heat, one covered, the other uncovered. Which reaches the boiling point first? From which does the water first evaporate?

The evaporation of water is an important factor in cooking. The rate of evaporation is proportionate to the surface exposed to the air and not to the amount of water in the kettle.

Thus the same quantity of syrup or sauce made in a shallow pan will naturally become thicker than when cooked for the same time in a deep pan having only one-fourth the surface.

Choice of Utensils

The art of the cook is displayed by the proper choice of utensils, or, if utensils are limited, by varying the time of the process or by the addition of more water for different purposes. Where long cooking is necessary choose deep utensils, reserving the shallow ones for the occasions when haste is essential.

The use of a cover serves several purposes; it protects the food in the kettle from foreign matter from outside, it aids in retaining the heat, and prevents the loss of water to some extent, as much of the steam condenses and runs back.

Even without a thermometer it is evident that water cannot be made as hot as fat, for a potato, a bit of meat, or a lump of dough might be cooked in water indefinitely without assuming the brown color which would come to any one of these articles in hot fat.

By observation also, we might discover that, however rapidly the water in a kettle boils, potatoes or other foods do not cook more quickly. In the same way we should find that absolute boiling or bubbling of the water was not necessary in order to cook some foods.

Temperature in Cooking

Through such observation and experience certain common laws of cooking have been established and these have been verified and explained by the experiments of modern scientists. The temperature of the water should be adapted to the type of food material to be cooked in it. Vegetables containing woody fibre to be softened require the boiling-point, while meats and eggs, of different composition, will cook more perfectly at a lower temperature. To extract juices and flavors of meats and vegetables to the fullest degree divide the substance finely to expose as much surface as possible to the action of the water and let that be cold. Soak first, then heat the whole slowly and hold below the boiling point till the end is gained.

Cooking with Water

When water is used only for the purpose of conveying heat let it be boiling hot when the food is put into it. Even then some of the solids in the food will be dissolved in the water and lost unless it be used. In some cases, as in strong flavored vegetables, this may be a

desirable loss. Mediums like hot fat, a thick syrup, or a gravy in which water is thickened with flour, by their density prevent loss of shape and flavor in the articles cooked in them. Rapid boiling in water tends to disintegrate foods. Meats are cooked to rags, potatoes become a soggy paste, and no intensity of heat is gained.

A Double-Boiler—an Invention of Count Rumford.

Stewing

Stewing implies moist heat, a sort of sweating process. Boiling requires much water, at its highest temperature; stewing is done with little water at a heat sufficient to soften the substance, but considerably below the boiling point. Hence boiling is more applicable to vegetables and stewing to animal foods.

Braising

Braising and fricasseeing and pot roasting are combinations of broiling or frying and stewing. Sections of meat are first browned to secure a good flavor and then stewed until tender in broth or gravy.

Water is a restless substance and is constantly escaping from the surface of our foods while they are being cooked. Keep the water in the right place, is a watchword against many of the difficulties that arise in cookery.

When a sauce or soup is too thick water may be added. On the other hand, when such foods are too watery the surplus often may be evaporated by cooking rapidly, uncovered, for a short time.

The Double Boiler

Besides kettles of various shapes, the double boiler and the steam cooker are important utensils dependent for use upon water. The double boiler we owe to the inventive genius of Count Rumford. Here is one kettle set in another containing water, and so long as there is water between a food and the fire no browning can take place in the food. This utensil is especially associated with compounds of milk and with the cooking of cereals. Though the food in the upper part does not quite reach the boiling point, this disadvantage is more than balanced by the long time which may be allowed for cooking with no danger of burning.

The steam cooker is found in many patterns, all on the same general plan. It differs from the double boiler in having several parts above the kettle containing the water, each with perforated bottom, so that the steam and vapor have direct access to the food.

The "bain marie" is a French device to serve the same end. One large kettle of water contains a number of

deep sauce pans. This is especially useful for food already cooked which is to be kept hot for intermittent serving in restaurants.

Coffee Pot for Making Drip Coffee.

The prevalent idea that all food must be served the moment it is cooked is due in many cases to imperfect methods for keeping it warm.

For tea and coffee a moderately soft water is generally considered best.

The different kinds of tea receive their name from the locality where they grow and from the size of the leaf, the younger leaves furnishing the choicer varieties. (See the illustration and description given on page 139 of *Food and Dietetics*.)

Making Tea

To make tea, use an earthen pot, fresh boiling water, and from one-half to one teaspoonful of tea for each half pint of water. Leave covered in a warm place to steep for three to five minutes and serve. For cold tea drain from the grounds at once.

Coffee

Names mean little in brands of coffee further than to indicate the original home of a special variety of the plant. The berry improves in quality for several years but loses flavor after roasting and more after grinding. One pound of good coffee measures about one quart and will make at least thirty full cups of strong coffee. Thus one pound should supply one person for a month

or four persons for a week. It is better to buy coffee in small lots often, unless it is ground as used.

Coffee may be steeped like tea or boiled. All things

STEAM COOKER WITH DOORS.

considered, the drip coffee pots are most satisfactory and the beverage thus made is more economical and uniform and probably less injurious than when it is boiled.

ICE

Ice is becoming more and more essential to civilized man, not only for summer use but for the year around. The future promises many improvements along this line, in more rigid inspection of the sources of the natural ice supply, in improved facilities for the manufacture of artificial ice, perhaps even in the individual home, by the transmission of cold brine as gas and water are now supplied from house to house from central plants, making it possible to dispense with the iceman's daily round. Patents have been issued for methods of cooling houses in summer similar to those used in cold storage plants. Food is now sent long distances in refrigerator cars and the whole subject of refrigeration has received much study. It has been found that different foods require various degrees of temperature.

Cold storage

The preservation of food by cold storage is of great benefit to armies and navies, but is not an unmixed blessing to the housekeeper for it has upset the seasons of foods, and when we can obtain a food at any time of the year it loses the charm it possessed when the season was a short one. Moreover, though food in cold storage does not spoil, it parts with something and undergoes certain changes which are not fully explained as yet. The housekeeper is usually safer in the use of canned foods than of those subjected to a long period of cold storage.

The household refrigerator is frequently expected to do impossibilities in caring for foods. It is a great labor saver when properly used and may be depended upon the year around and not merely in summer.

The Refrigerator

It should be placed in a cool, light, airy place, convenient to kitchen and dining room unless a second

A Refrigerator showing Direction of Air Currents.

refrigerator be placed there. If possible place it near the door so that the ice man need not track all over the kitchen floor. The cellar is no place for a refrigerator. A good cellar is a safe place for most foods, and a poor one will injure the refrigerator.

In many households the cost of ice is more than saved by the preservation of food that would otherwise be lost. The average family will use from one to two dollars' worth of ice a month at city prices.

In modern houses the water pipe from the ice com-

partment of the refrigerator is often connected with the sewer pipe. This should never be direct. Let the pipe drip into a spout.

A refrigerator should have several compartments, that foods like milk and butter may be kept apart from others. The coolest place is usually under the ice. A tile or enamel lined refrigerator has many advantages, but any that are properly made if kept clean will do good work. Any break should be repaired at once, for an overflow of water or a crack in the lining may cause an odor which will flavor all food.

Care of Refrigerator

The ice should be washed clean before putting in place and no food should ever be placed upon it. The jars of water chilling for table use are the only things to be allowed beside the ice in its compartment. No food should be put away while warm.

How often a refrigerator should be cleaned depends upon the way it is used. If nothing is allowed to spill or rub against the sides or shelves, or, when this happens, if it is cleaned away at once, and if nothing stays there until unfit for food, frequent scalding is unnecessary. Every week or fortnight when the ice is nearly out remove shelves and scald them thoroughly and wash throughout.

Glass and stone jars, deep earthen and agate plates are the best utensils in which to put foods away in the refrigerator.

The principle of the refrigerator is exactly that of

the Aladdin oven—a closet with shelves is put inside a case of non-conducting substance.

Ice Cream Freezer

On the same plan, our ice cream freezers are built. The outer tub is a non-conducting substance to prevent the entrance of heat.

There are jugs for hot water and coolers for ice water constructed according to the same idea.

Salt is mixed with ice because its affinity for water will cause the ice to melt, and when a solid changes to liquid form, heat is absorbed from the surrounding objects. Cracked ice about the size of coarse rock salt is used, the proportion being three parts ice to one of salt.

Ice cream, custard, or fruit juice to be frozen, should be more highly flavored and sweetened than if it were to be eaten at an ordinary temperature. The organs of taste are benumbed by the cold, and a stronger flavor is necessary to produce an effect. The cost of ice for making frozen desserts is less than the cost of fuel for cooking many.

PREPARATION AND PRESERVATION OF FOODS

All processes of cooking are the result of gradual evolution. Nature ripens fruits and seeds in the sunlight. Dry nuts and seeds are stored by squirrels and other creatures. Primitive men were but little in advance of the squirrel when they saved different grains and pounded or parched them for food.

Uncooked Food

We may understand better the origin of our processes of cooking if we first consider the foods available without special preparation. Tropical countries have always afforded a variety of fruits capable of sustaining human life. It is estimated that many more persons may be supported on a given piece of ground planted to bananas than by the same surface planted with any crop in a temperate climate. The breadfruit, fig, date, and raisin are other important fruit foods.

In temperate climates without knowledge of agriculture mankind must depend largely upon animal foods, and doubtless here would come the first application of heat to change the flavor or to aid in preservation of the food from day to day.

Preserving Food

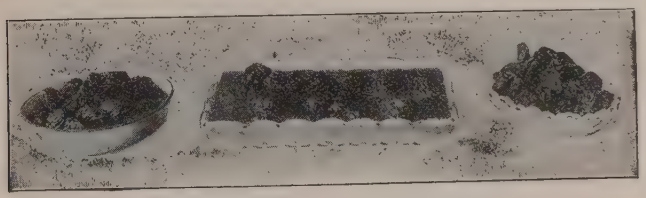
The drying of fruits and the smoking of meats naturally were the earliest methods of preserving foods. Probably the preservative action of smoke was accidentally discovered and the salting of fish may have been derived naturally from its association with salt water.

Since all foods are mainly water it was an immense advantage to wandering tribes to reduce their burdens

by drying their foods. Even the most primitive housekeepers discovered that in proportion as food parted with water it was less liable to ferment, mould, or decay, though the scientific reason for this that most bacteria can live and develop more rapidly in fluids has only been discovered recently by bacteriologists.

Dried Foods

The modern housekeeper seems to be losing the art of drying foods, yet in many cases that mode of preservation is more desirable than canning or cold storage.



Dried Prunes Before and After Soaking.

One reason why dried fruits have fallen into disrepute is this: To remove the discoloration which takes place when cut fruits are dried or evaporated in factories they are often bleached by sulphur and suffer loss of flavor. Another reason for not using dried foods is that it takes time to soak them.

When they are to be made ready for use the first step is to supply as much water as they lost from evaporation. This is best accomplished by long soaking without heat, merely cooking them enough at the end to soften tough fibres and to prevent fermentation.

Honey and olive oil may be considered with the food products requiring little preparation. They were commonly used by the ancients.

Nuts

Nuts are an important food in some parts of the world. The peasantry of southern Europe find in the chestnut a substitute for cereals. It is made more digestible by a partial cooking. The neglect of nuts in our country is due to the cheapness of cereal products but there is an increasing use of them as a substitute for meats. Average shelled nuts have weight for weight about twice the fuel value of wheat flour because they contain so much fat. Chestnuts are about two-thirds starch, and contain little fat. Other nuts are from one-third to two-thirds fat.

It is a common idea that nuts are very indigestible. That may be changed if we learn to masticate them properly or to grind them and combine with other foods instead of eating them without chewing properly, as dessert after sufficient nourishment has been taken.

Nuts and fruits supplement each other, to some extent, the one containing what the other lacks.

The leguminous seeds, peas, beans, lentils, and peanuts, are somewhat like nuts, but are not so rich in fat and are unpalatable unless cooked. Most of our common vegetables are the result of ages of cultivation.

Fruits

We are only on the threshold of the possibilities of combining and preserving fruits. An increased use of fruit, fresh and preserved, will tend to cause a diminished use of alcoholic beverages. Fruit juice is one

of the best agents to quench thirst. A desire for some other beverage than water may be taken as a cry for food. Fruit juices, hot or cold, will better supply this desire than tea or coffee. The expressed juice of real fruit may be sterilized and then charged with carbon dioxide, as well as the chemical compounds now sold as soft drinks.

Jellies

Inferior fruits and skins and cores, if clean, may under pressure yield juice for jellies, or to flavor other foods. Fruits may be blended, pressed, and strained, and used in many ways even for children and invalids when the solid particles and seeds would prove irritating. The juice of the lemon or orange and the pulp of the banana may thus be combined.

Canned Goods

Since modern housekeepers lack patience to dry foods and soak them out again the canning factory has come to their aid. Within the last half century this business has developed immensely. Home canning cannot compete with that of the factory, because there a higher temperature is gained which more effectively sterilizes the food.

Canned foods keep because the bacteria in them are destroyed and others cannot enter because the air is kept out. Fruit will not spoil even if the jar is not full, provided the air above it has been sterilized.

Unfortunately, ignorance of the processes involved makes the consumer demand impossibilities in color and form, and this has led the manufacturer to use artificial colorings freely.

Preservatives of different kinds have been found to be cheaper than care and time expended in the preparation. Clean foods keep better than unclean ones, but skilled human labor is the means to cleanliness and that is expensive.

Preserving in Sugar

Pound for pound preserves which include jellies made from fruit juice and marmalades from fruit pulp with equal weight of sugar keep even if exposed to air, because bacteria do not flourish in dense substances.

Some fruits are preserved half by drying in the sunshine, half by sugar. Spiced fruits were more common before the days of air-tight jars, for spices are enemies of bacteria.

Canning

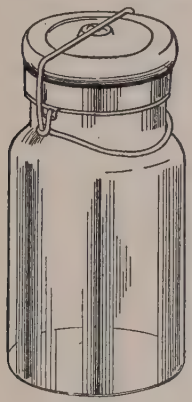
The canning of food is not a complicated process. Everything must be clean, that is, free from spores of mould or germs that promote decay. Such cleanliness may be accomplished in part by water, partly by heat. The jars, covers, tunnels, and spoons must be subjected to boiling water to render them sterile. They are usually put in cold water which is slowly brought to the boiling point. The scalding of tomatoes and peaches not only renders the skin easy of removal but sterilizes the outside so that nothing is rubbed on to the inner surface as it is peeled.

An accumulation of dust, mould, and decayed portions, even if each be slight, cannot but affect the result. Therefore the fruit for any purpose must be carefully picked over and washed. Very juicy fruits, like currants, may have the juice expressed without first

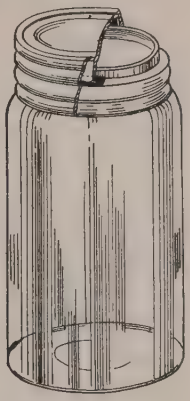
cooking, while others, like the crab apple, require the effect of heat to start the juice.

Utensils for Canning

The utensils for cooking and straining should not be of metal if the best flavors of the fruit are to be retained. Agate or earthen ware kettles, wooden spoons, and linen strainers are desirable for this work. If



"LIGHTNING."



IMPROVED "MASON."

PRESERVE JARS.

necessary to use metal anywhere, do it as quickly as possible, and never leave an iron spoon in a kettle of cooked fruit.

Sugar is not essential to canning, but is usually added for flavor and because fruit cooked in a syrup keeps its shape better than when cooked in water.

Preserve Jars

The best jars are those having glass covers and fastening with a spring. The screw tops are easily rendered imperfect and are hard to close and open.

The less lettering there is in the glass the surer we are of keeping it clean. The rubber rings spoil quickly and none that are stretched or brittle should be used. New ones are usually required every year. Pint jars are more satisfactory for the average family than the larger sizes.

A grocer's tunnel is desirable for filling the jars, and a half-pint dipper with a long handle is another help.

Essential Points

The essential points in canning fruit may be summed up in very few words. All that is necessary is to have the fruit and everything that comes in contact with it sterilized, and then keep the air away from it. That is, the fruit and whatever it touches must be raised to a sufficient degree of heat to destroy any micro-organisms already there that would cause change of form or decay. This being done care must be taken that no others are allowed to enter through the air. There is no magic about it, only constant watchfulness.

Gentle cooking, long continued, seems to be fatal to the bacteria, which might work so much ill, and this method is more conducive to preserving the natural appearance of the fruit than is intense heat for a short period.

Fruit, vegetables, milk, and meats all are prepared in similar fashion. Animal foods spoil easily because of their composition.

Primitive man made use of anything near his hand to satisfy his need and accidents and extreme hunger made many foods appetizing to our ancestors which might not appeal to us today if we had not inherited the taste for them.

According to W. Mattieu Williams, "the fact that we use the digestive and nutrient apparatus of sheep, oxen, etc., for the preparation of our food is merely a transitory barbarism." Other authorities agree with him that the art of cooking may some time be so developed as to enable us to prepare the coarser vegetable substances in an easily assimilated form without depending upon animals as middle men.

The Art of Cooking

The art of the cook has done much to make unlikely food materials attractive, but there is another phase of the question, and that is the problem how to make what we know is nourishing both pleasant and attractive. The cook of the past had to make the best possible use of the meager nutrients at hand. The cook of the present and future has the harvests of the whole world within reach all the year around. How shall such abundant material be combined to satisfy the palate without overloading the digestive organs?

More important still, how shall we select and prepare foods that they may produce sufficient energy in the human body for the great tasks awaiting it in our complex civilization.

During the last twenty years or less much material has been published by the U. S. Department of Agriculture recording the results of investigations. Many of these pamphlets can be secured for the asking.

Classification of Food

For practical use all the principal substances found in our foods may be classified under five heads: water, mineral matter, protein, fat, and carbohydrate. The first, and its importance in cooking, has already been considered. The second appears in different forms in all foods, rarely exceeding one per cent. of their natural weight. This it is which remains as ash when a food is burned. It is most prominent in the refuse portions of food which are removed before coming to the table, such as the husks and bones. Some of these mineral matters are readily soluble in water, hence are lost when no use is made of the water in which vegetables are boiled.

Common salt is the principal mineral substance in use in cooking.

Organic Foods

The other three great classes of food substances are known as organic compounds,—the protein, fat, and carbohydrate.

The proteins are subdivided into many classes, but so far as practical cooking is concerned, little need be said of these here. Since this type of material constitutes about one-fifth of the human body by weight it must be found in the daily food. Lean meat, eggs, milk

*Following the nomenclature of the U. S. Department of Agriculture, the term protein is used to denote all classes of nitrogenous foods.

curd, and portions of grains and seeds are the principal sources of this class of food. As a whole, protein of vegetable origin is more slowly and less perfectly absorbed than animal protein. The principal duty of nitrogenous foods is to build up the body and to keep it in repair.

Fats

Fats are obtained from both animal and vegetable sources and for the convenience of the cook are commonly separated by heat or pressure. Considerable fat is stored as a reserve fund in the normal human body. Its principal office is that of fuel to keep the body's machinery going.

Carbohydrates

Carbohydrates are chiefly of vegetable origin and include starch and sugar. They are not apparent to any extent in the body but are important fuel foods, though more than two pounds of starch or sugar would be required to produce as much energy or bodily heat as one pound of fat.

Only by a knowledge of food composition is it possible to plan satisfactory menus. Recipes then may be modified, as by increasing or diminishing cream or butter, that they may be adapted to the other foods served at the same meal.

The provider of food, the cook, and the consumer all should be familiar with the composition of common foods in order that the daily meals may be adapted not only to purse and palate but to climate and the condition of individual bodies.

MILK AND ITS PRODUCTS

Milk is a complete food for the young animal because it contains the five fundamental types of food material—water, mineral matter, fat, carbohydrate, and protein.

The analysis of average milk is about as follows:

Water	.87
Mineral	.01
Fat	.04
Casein	.03
Sugar	.05
	1.00

Since the fat is the most valuable portion commercially, dairymen study to feed their cows in such a way as to increase it, and in some instances milk has been produced containing 6 per cent of fat.

Use of Milk

Though mainly water, milk is a valuable nutritious food and should be used freely by itself and in combination with other food materials, in soups, sauces, and puddings. When we remember what the department of agriculture has proved for us, that a quart of milk is quite as nourishing as a quart of oysters for which we pay six or eight times as much, we can see that it is desirable to use it more freely than is generally done. Especially during the summer months we do well to substitute milk and cheese for meats. There are average families which do not use over a pint of milk a day; there are others who find it neces-

sary to take a gallon, and the meat bill in the latter cases becomes proportionately small. A pint of milk a day is not an excessive allowance for each member of a family, though many households consume much less.

Composition of Milk

To study the composition of milk put a quart of fresh milk in a glass jar and leave it twenty-four hours or longer until it is thick and sour. What percentage of the whole is the cream? Remove the layer of cream on top to another jar, screw on the top, and shake until the fat separates from the watery portion of the milk. Collect the butter on a spoon, wash out the milk by pressing and folding with a knife. Weigh or estimate carefully the value of the butter obtained. What proportion of the original bulk of milk does it represent? Persons fond of unsalted butter may thus prepare it for themselves.

Why is salt added to butter?

The remainder of the milk, now a thick mass of curd, may be pressed out with a spoon or cut with a knife to show the greenish water known as whey. What nutritive substances are there in this?

Turn the thick milk into a two-quart pan and fill with hot water, in twenty minutes drain the water off through a strainer, that no curd need be lost, and pour on more hot water. Do this several times until the curd loses its sour taste and has contracted, but do not allow it to become too hard. If boiling water is used the curd will become unpalatable and indigestible.

Buttons have been made of sour milk treated by heat and pressure.

Sour Milk Cheese

Press as much water as possible from the curd and compare the quantity with the original amount of milk. Remember that this still contains much water. Now combine the curd with butter or thick cream, salt it and shape in small balls or pack in cups. Thus we learn something of the value of milk and have made a sour milk cheese more palatable than when the whole mass of curdled milk is heated on the stove or strained in a cloth.

Junket

With prepared rennet in liquid or tablet form the curd and whey of sweet milk may be separated. The milk should be warmed slightly before the dissolved rennet is added, then chilled in the dishes from which it is to be served. This is known as junket or rennet custard.

Absolute cleanliness is essential for every utensil to come in contact with milk. The souring of the milk is due to the action of bacteria which come to it from contact with utensils and the air. Its fluid form and nutritive material afford a medium peculiarly favorable to the development of germs of disease, as well as to the growth of useful bacteria which aid in butter and cheese making.

The growth of such micro-organisms is hastened by moderate heat, but most of them are killed by raising the milk to the boiling point.

Sterilization requires a temperature of two hun-

dred and twelve degrees F, continued for about twenty minutes; this process usually changes the flavor of the milk so that it is disagreeable to many palates. The high temperature also causes the fat globules to separate instead of being retained in the form of cream.

To Prevent Souring

Pasteurization takes its name from the noted French scientist, and consists in raising the milk to a temperature of about one hundred and fifty-five degrees F. By this means the flavor of the milk is unchanged.

The cook finds it safe to scald the milk for soups, bread, or puddings, to prevent its souring during the process, before cooking it with the other ingredients. There is a gain in the time of cooking when the milk is heated while the other materials are being prepared.

Neutralizing Acidity

A bit of bicarbonate of soda dissolved in milk before it is heated often will neutralize any incipient acidity and make it usable for puddings or soups. The "cream" of tomato soup is liable to curdle unless the acid of the tomato is neutralized by soda or the milk thickened with flour before the two parts are combined. It is safer with all "cream" soups to keep the stock and thickened milk apart until just before using.

Mixing with Acid

Lemon or other acid fruit juices are sometimes mixed with milk for sherbet without curdling if, before the juice is added, the milk is thoroughly chilled in the freezer can.

Salt sometimes curdles milk, especially when it is added to hot milk.

Since the solid portions of milk readily adhere to the bottom of the saucepan placed in direct contact with heat, and the resulting burned flavor rapidly penetrates the whole of the milk, a double boiler or its equivalent, one dish set in another of boiling water, is the best way to heat milk.

Milk is an important ingredient in preparing cocoa and chocolate, and such beverages rank with soup in nutritive value. Hot milk sipped slowly is a simple remedy for exhaustion and sleeplessness. Hot milk should be served with coffee when cream is not available. The milk soups are valuable foods and have as their foundation the white sauce described further on.

Most of our puddings require milk, especially the cereal and custard varieties.

Cooking in Milk

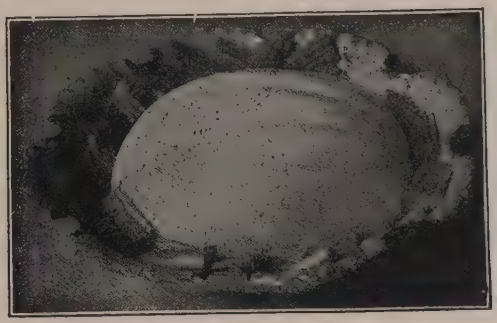
Because there are solids in the milk more time must be allowed for the grains of rice or corn meal to absorb the moisture than when cooked in water. The protein portions of the milk have somewhat the same effect as the egg used to coat the croquette or oyster before frying. If the particles of grain are thus varnished over they cannot absorb moisture as rapidly as from clear water. Hence, it is often advisable to cook the grains in water first and finish the process in the milk.

In making blanc mange from Irish moss, if the moss is first cooked in a small quantity of water and

the thick paste strained before it is added to the milk, there is no loss of milk. When the moss is cooked directly in the milk there is some loss of milk when the moss is strained out.

Concentrated Milk

The baked Indian meal pudding and the creamy rice pudding require long, gentle baking. There is a continual evaporation of moisture from the surface of



"BLANC-MANGE."

the pudding pan, and really a condensing of the milk. In proportion as the pudding dish is refilled with milk, the pudding increases in nutritive value.

Milk is commonly used for mixing dough of many types and this adds to the nutritive value of bread and cakes.

Bread made of milk or part milk will have a browner, tenderer crust than bread made wholly with water. There seems to be good ground, however, for the prevalent idea that bread or cake made with milk does

not keep so well as that made with water. A certain cheesy flavor develops where milk is a principal ingredient.

Sour Milk

Sour milk is often used for mixing griddle cakes and quick doughs, because the acid it contains will be neutralized by the soda added, and thus produce the effervescence which makes the dough light. The souring process seems to have so affected the protein substances in the milk that such a dough is tenderer than one made with sweet milk and baking powder. The use of sour milk will be further treated in the section on doughs.

Skimmed Milk

For doughs, soups, and puddings, in which additional fat is introduced, skimmed milk may be used as well as full milk.

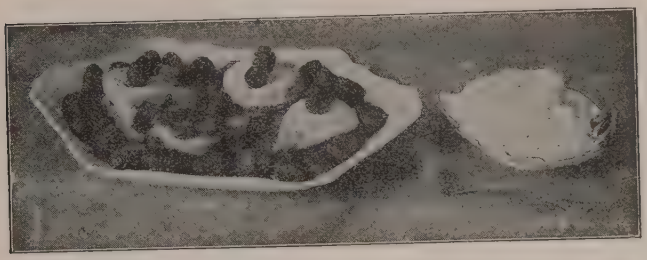
The use of cream in well-to-do families is increasing. Whipped cream is demanded as a garnish or sauce for many desserts quite complete in themselves.

The process of beating or "whipping" cream gives it an attractive appearance, and by expanding its particles probably makes it more digestible.

BUTTER

Butter is one of the most digestible forms of fat. An ounce of butter a day is a fair allowance for each person when meats, lard, olive oil, and cream are used. To test this in your own case, divide one ounce of butter in three portions, one for each meal, and see whether you naturally use less or want more. Or, this

may be tried in a family by shaping a portion of butter into balls with butter paddles and noting the amount consumed by each person at the table. An ounce of butter is easily secured by cutting a quarter pound pat into quarters. Or, if that is not available, measure the butter. Two level or one round tablespoonful is equivalent to one ounce. A pound of butter will measure one pint.



Individual Shortcakes to be Served with Whipped Cream.

Butter for Flavoring

Butter is probably rendered slower of digestion by cooking, and for this reason it is wiser to flavor foods with it after they are cooked. Often it is better to allow the individual eater to butter the broiled meat, or fish, or mashed vegetables, according to his own taste. Then there need be no waste if a portion of the whole dish is not eaten, and if the food is reheated the flavor is better.

In one dietary study of the Department of Agriculture of the United States (Bulletin 75 from the office of Experiment Station), so much butter came back in

the platters where it had been poured over steaks, chops, and fish, that it was assumed that none was consumed. Certainly, in every household considerable butter and other valuable fat finds its way to the dish water. One of the first steps in the application of science to housekeeping is to stop such needless waste.

Composition of Butter

In a glass measure cup, or a tumbler, put a quarter of a pound of butter, set the glass in a pan of warm water and leave until the butter melts.

Estimate the percentage of clear fat.

What other substances appear to be present?

How does this explain the sour and cheesy tastes sometimes noticed in butter?

White Sauce

Milk thickened by flour and made richer with butter and flavored, is known as milk gravy, drawn butter, or white, or cream sauce. It is a substantial food in itself and forms a valuable addition to fish, eggs, meats, and vegetables. By its addition a small portion of any food substance is extended and made to do more service, and flavors too pronounced to be agreeable to all are much modified.

There are several ways of compounding this sauce which apply to other sauces in which butter is the principal ingredient. A general formula covering the ordinary sauces—white, tomato, and brown—is this: one ounce of butter, one-half ounce of flour, and one-half pint of liquid; or, to express the same quantities in other terms, two level tablespoons of butter, the same of flour, and one cup of liquid.

Methods of Making

1. Melt the butter in a saucepan, stir in the dry flour, cook and stir until frothy all over, then draw to a cooler part of the stove and stir while adding the liquid hot or cold, then cook again till thick, stirring till smooth.

2. Another way is to rub butter and flour together and stir into the warm liquid in a double boiler, then stir till thick and smooth.

3. When thin cream is substituted for butter and milk, or when less butter is to be used, rub the flour smoothly with a little cold liquid and stir into the remainder, which should be hot, and cook over water until smooth. Then add butter and season.

The theory of the first method is that the butter attains a slightly higher temperature than the milk and if the flour is combined with the hot butter it is cooked more quickly and thoroughly than when put into milk.

In the second case, longer time is required, but the flavor of the butter is changed less than by the first method.

The third way is more economical of butter.

Brown Sauce

Butter is also used for brown sauces. These are made after the first plan for the white sauce, but the butter is allowed to brown before the flour is put in, and is cooked until a reddish brown hue is acquired before the liquid, which is usually brown meat stock, is added.

Varieties of White Sauce

In many other sauces the plan is similar to that followed in making the white sauce, but meat stock, strained tomato, or other vegetable stocks, are used in place of part or all of the milk.

These sauces are the foundation of many entrees or made dishes, such as croquettes and soufflés.

For meat or fish croquettes the sauce is made of a double thickness by using only half as much liquid. It is then combined with about an equal quantity of meat, seasoned and cooled, when the mixture may be shaped. Soufflés have the sauce as the basis and the puffy effect is produced by eggs.

Creamed Dishes

The usual white sauce, combined with an equal quantity of meat, fish or vegetable stock, gives us the cream soup, cream of chicken, cream of cod, cream of asparagus, etc., etc.

Since butter is not pure fat but contains water and curd, it is less desirable than other fats for greasing pans unless it is melted and the fat used alone.

Precautions in Using Butter

Except in cases when it is necessary to brown something quickly, butter should not be used for frying or or sautéing. It is too expensive and burns easily. Because of the quantity of milk, often sour, contained in butter, it is not strange that some recipes for rich cake call for small quantities of soda to balance this acidity. For such purposes, butter is frequently washed to remove milk and salt.

That butter responds quickly to changes of temperature should be remembered in mixing any dough,

like pastry, when a large proportion of butter is used.

Rancid Butter

Slightly rancid butter may be made usable for some purposes by scalding it in water, then chilling and removing the cake of fat on top. If further treatment is necessary the fat alone may be heated with bits of charcoal.

CHEESE

Composition

The origin of cheese is probably more ancient than that of butter. It is a form of dried or condensed milk convenient for transportation. Milk is nine-tenths water, while cheese contains but a trifle over three-tenths water. Average cheese is about one-third each water, fat, and casein.

Nutritive Value

A pound of cheese costing sixteen cents contains about twice as much nutritive matter as a pound of meat which will vary in price. There will be less waste in the cheese than in an average piece of meat. Moreover, cheese has the advantage of keeping better than the meat under adverse conditions. Its disadvantages are that because of its concentration it is not easy of digestion. This may be overcome somewhat by diluting the cheese with milk, as is done in many of the rarebits, fondues, and soufflés. The addition of a small quantity of bicarbonate of potash or soda aids in making cheese soluble. There is danger that the cheese will be over cooked. When merely melted it is probably quite as digestible if used moderately, as

many of our common ways of preparing meat. Judging from the types of people who depend upon cheese largely it might be used with us more generally than it is. The annual consumption of cheese in this country is only about three pounds per capita. We might well use cheese more freely in cooked dishes, for flavor as well as for nutriment.

One of the simplest ways to use cheese is to melt from two to four ounces in a cup of white sauce to combine with rice, potatoes, macaroni or eggs.

With the increasing cost of meat the use of cheese in many ways is advisable. Four-fifths of an ounce of cheese will be about equivalent to two ounces of the edible portion of beef from the round. Thus if at any meal we can plan to add a scant ounce of cheese to each person's ration we may then reduce their portion of beef by two ounces.

TEST QUESTIONS

The following questions constitute the "written recitation" which the regular members of the A. S. H. E. answer in writing and send in for the correction and comment of the instructor. They are intended to emphasize and fix in the memory the most important points in the lesson.

PRINCIPLES OF COOKERY.

PART I.

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. *Do not copy answers from the lesson paper.* Use your own words, so that the instructor may know that you understand the subject. Read the lesson paper a number of times before attempting to answer the questions.

1. Give a rough diagram of the stove or range with which you are most familiar. Show where in the oven and on top of the stove the heat is greatest, and explain why.
2. What is your method of starting and regulating a coal fire?
3. Counting the time required to keep fire and stove in good condition, what is the most economical fuel within your reach?

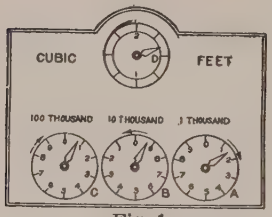


Fig. 1.

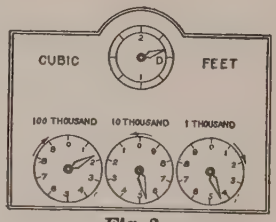


Fig. 2.

4. Fig. 1 represents the dial of gas meter at the beginning of the month; Fig. 2 at the end of

the month. What is the reading in each case, and what will be the amount of the bill at $1.25 per 1,000 feet of gas?

5. If you use a gas stove, read the meter before and after a day's baking and find the cost of fuel. If other fuel is used, give the amount and approximate cost.
6. Where, in your experience, would a thermometer be helpful in cookery?
7. Mention several foods requiring the action of heat, yet which need little preparation and few utensils.
8. What different ways have we of cooking with the aid of water?
9. Is it possible to cook in water that does not boil? Give examples.
10. What gain in cooking certain foods over, rather than in, water? Describe utensils by which this can be accomplished.
11. What kinds of foods should be kept in the refrigerator? Describe the refrigerator, or whatever is used in its place.
12. What are the essential points in canning fruit?
13. How should dried fruit and vegetables be prepared to restore them as nearly as possible to their original condition?
14. Are there any substances suitable to add to foods as preservatives?

15. What are the relative merits of paper bags, wooden boxes, tin cans, and glass jars for keeping groceries in pantry or store closet?
16. How can you determine for yourself that there is water and fat in milk, cheese, and butter?
17. Make a menu for meals for two days, introducing as many dishes as feasible that contain milk or cheese.
18. Suggest treatment and uses for sour milk, dry cheese, and butter of poor flavor.
19. Make a white sauce three times or more, putting the ingredients together in different order each time, and report which seems the most satisfactory and expeditious.
20. Are there any questions which you would like answered, relating to the topics taken up in this lesson?

NOTE.—After completing the test sign your **full name.**

PRINCIPLES OF COOKING

PART II

NEW ENGLAND KITCHEN OF THE OLDEN TIME

PRINCIPLES OF COOKERY

PART II

EGGS

Since the egg is similar to milk in composition, both containing water, fat, and protein, without starch, and as there are many simple dishes in which milk and eggs are combined, it is natural that that should be our next topic.

The egg may seem a small article to have much space devoted to it, but there is no other food so indispensable to the art of cooking. A French chef has compared the office of eggs in cooking to the usefulness of *the, an,* and *a,* in conversation, both would be difficult without them.

Usefulness of Eggs

Aside from its great food value, and there is no egg of bird that may not be eaten, the egg is a general harmonizer in the kitchen; it serves to thicken custards and sauces; to clarify soups and jellies; to make a coating of crumbs adhere to chops or croquettes; it puffs up soufflés; it leavens a whole group of cakes; it garnishes salads and emulsifies oil into a smooth, rich dressing for them, and combined with odd bits of fish or meat, it makes many a savory dish of what would otherwise be lost.

The composition of eggs varies with the kind of fowl and its food. The edible portion of the average hen's egg is nearly 75 per cent. water, 12 per cent. protein, 12 per cent. fat, and 1 per cent. ash or mineral matter.

Since carbohydrates are lacking, we naturally combine eggs with starches and sugar which supply the class of substance missing.

Like milk, eggs may be eaten either raw or cooked, and the ways of cooking eggs, however elaborate they seem, may be reduced to a few simple processes.

We shall have the key to all cookery of eggs if we study some eggs cooked by moderate and some by intense heat.

Effect of Heat on Eggs

To see how the egg is affected by different degrees of heat, we may poach several eggs, or drop them from their shells into water at different temperatures. When an egg is dropped into a saucepan with cold water, and heat applied, before the egg begins to cook, the egg and water mingle somewhat, showing that a portion of the raw egg is soluble in cold water. As the water is heated, this soluble egg becomes cooked and rises in a thick froth on top, and if the cooking is continued longer, this froth may contract and settle. This point is turned to the cook's advantage in clearing jellies, soup stocks, and coffee. Thus even the little portion of the egg white adhering to the shell is sometimes utilized for clearing coffee.

When an egg is dropped directly into boiling water, the outer portions of it are hardened by the heat. This cooked egg does not appear to be soluble itself and, moreover, protects the under portion until that also is penetrated by the heat.

Experiment.—Boil one egg rapidly; put another into the boiling water, remove from the stove, and let stand for fifteen minutes or more. Compare temperatures with a thermometer. See which egg is more tender, and presumably, more easy of digestion.

Temperature for Cooking Eggs

The white and yolk of eggs cook at different temperatures, and these appear to vary slightly with the freshness of the egg. For general use it is sufficient to remember that 150° to 180° F is ample heat for dishes composed mainly of eggs and milk. When starch is used, a higher temperature is required, and whenever possible, this should be obtained before combination with the eggs. Having learned this, we have the key to the successful cooking of all custards and the like. A custard that has curdled, or wheyed, or settled in the center, has cooked too long, or in too hot an oven. The custom of setting a custard in a pan of water in the oven is wise, for the moisture lowers the temperature of the oven. Excessive beating of eggs may aid the curdling of the custard; it certainly is a waste of effort here, however it may be in cake making.

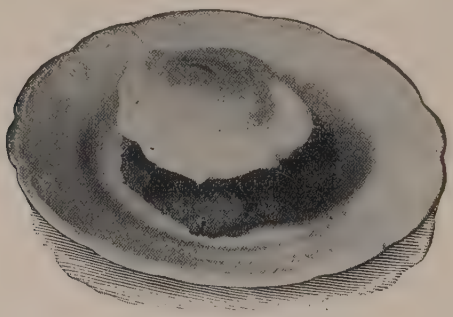
Custards

Average custards are made with three to six eggs to a quart of milk; naturally the larger number makes a firmer custard, but the other is quite palatable. Often

gelatine or corn starch is used to assist in thickening milk when eggs are expensive, but these combinations are not real custards.

Eggs with Starch

There is a long list of puddings where a custard or egg and milk are combined with starchy materials. In such cases as have already been stated, it is wise to have the starch, whether in the form of rice, tapioca, sago, or corn starch, cooked in the milk before the



POACHED EGGS ON FISH BALLS.

egg is added. Bread or cracker crumbs may be combined directly with the milk, for then the starch has already been cooked.

Dropped Egg

A single dropped egg may show that water need not boil in order to cook an egg. Even if a thermometer is not available, it can be seen that the white of the egg instantly changes in appearance when it comes in contact with water far below the boiling point. A muffin ring placed in the water assists in keeping the egg

in good shape. A little salt and lemon juice or vinegar in the water makes the egg harden quickly on the outside instead of mingling with the water.

Value

Since we reckon the cost of other foods by the pound, for easy comparison we must estimate the value of eggs on the same basis. It will be found that the average hen's egg weighs about two ounces, and that eight good sized eggs in their shells, or nine or ten shelled eggs, weigh one pound. The fuel required, the labor of preparation, and the waste are much less with eggs than for most other foods.

Some experiments recorded in "Eggs and Their Uses as Food" (Farmers' Bulletin No. 128, U. S. Dept. Agl.), show that it cost more than twice as much to serve and satisfy at breakfast a family of over one hundred women in a college boarding hall with mutton chops or beefsteak at less than 20c. per pound, than with eggs at 25c. a dozen.

Preserving

Commercially, there are many grades of eggs, dependent upon their age. Cold storage has done away with most other methods of preserving eggs. Anything that will exclude air, without bringing ill flavor to the egg, will aid in preserving it. Eggs are available almost everywhere at all seasons and even at their highest prices, are not more expensive than the choicer cuts of meat.

An inferior egg injures all other materials with which it is combined, therefore it is never economy to buy poor eggs. When eggs are high do without them,

making dishes which require few, if any; then when they are again plenty they will be all the more appetizing. With proper conditions for keeping eggs, it may be economy for some housekeepers to buy a large quantity in the fall and pack them carefully in an upright position, but many find it better to give the grocer a few cents more than to take the time and risk of loss.

COMBINATION OF EGGS WITH OTHER FOODS.

Any fundamental food, like the egg, must be served in a variety of ways or we tire of them. Foods having short seasons should be prepared in the simplest fashion.

Variety

The nutritive value of the food is not materially changed by a variation in the method of cooking, provided no additions are made to it. It may appeal more to the palate in one form than another, and the time of digestion may vary, though in the end as much may be absorbed in the one case as in the other.

Combinations to Reduce Cost

To illustrate this point, let us take two eggs costing at average prices two cents each, or four cents. Whether boiled in the shell or dropped from the shell into boiling water, their food value would be practically the same; when scrambled or made into an omelet there is a slight addition of nutritive material.

But the rigid economist says that eggs at two cents apiece are too expensive for the family of limited means. Then comes in the art of cooking to show how the eggs may be combined with less costly food ma-

terials to make several palatable dishes which may take the place of meats and yet require but little more labor in preparation.

With White Sauce

First, the two eggs may be combined with one cup of white sauce; this may be served with the omelet, or blended with the scrambled egg, or made into a souffle, or served with hard boiled eggs chopped or sliced.

The identical quantities might be used in each case. By such combination the cost of the dish is doubled, but it will go at least twice as far and its fuel value is more than trebled. Or, instead of the sauce, we may use one cup of milk thickened with white bread crumbs and well salted and omit the butter or use less. This will reduce both cost and fuel value.

With Cheese or Ham

The foundation may be again extended and varied. To the two eggs and cup of white sauce may be added two ounces of grated cheese or two ounces of chopped ham. If the ham is of average fatness, the fuel value of the cheese and ham will be about the same. The ham might be more expensive than the cheese were it not that this is a way to turn to good account the smaller bits of meat. By this addition the dish, at two and a half times the cost of the eggs, becomes about five times as efficient in fuel value.

Serving

This combination may be served in many forms,—the cheese may be warmed in the sauce and poured over the eggs hard boiled, poached or made into an omelet, and the ham might be used in the same way.

After mixing sauce, cheese, and yolks of raw eggs,

the stiff whites of the egg may be folded in and the mixture baked in one dish or several little ones.

All such combinations are naturally eaten with some form of bread, and here again the whole cost is diminished with an increase of fuel value.

A summary of these possible combinations may be clearer in tabular form, as follows:

	Weight.	Cost.	Cal.
2 eggs	4 oz.	4c.	161
White Sauce:			
1 C. milk	8 oz.	2c.	162
Butter	1 oz.	2c.	217
Flour	½ oz.		51
Cheese	2 oz.	2c.	246
Ham	2 oz.	2c.	207

It would be interesting to trace the history of egg cooking and find who first discovered that eggs cooked in milk, sweetened and flavored, made the palatable compound we know as custard; or who first discovered the delicious sponge cake or "diet bread," as our foremothers called it.

Sponge Cake

All our modern recipes for sponge cake, angel cake, lady-fingers, and sponge drops, are but slight variations from the recipes to be found in old cook books, which call for the weight of the eggs in sugar and half the weight of the eggs in flour.

The tendency of the artistic cook is to separate the two parts of the egg, using the yolk to produce certain effects and the white for others.

The proportions are about the same in the angel cake

as in the sponge cake, but the egg whites only are used. The egg yolks, left from such cakes, are more desirable than the whole egg for many custards and sauces, producing a richer and more creamy effect, since the yolk of egg contains considerable oil.

Eggs in doughs may better be studied here with other qualities of eggs rather than later with doughs. **Eggs in Doughs**

Under this head may be included noodles, popovers, Yorkshire pudding, cream puffs, eclairs, tim-

EGG TIMBALES.

bale cases, fritters of many varieties, as well as sponge and angel cakes and macaroons.

From a study of these distinctly egg doughs we may see why eggs are added to muffins, puddings, etc.

These may be divided into three classes: (1) When the egg is used merely to stick flour together, such as noodles and timbale cases. (2) When the cake resulting is to be hollow like popovers and puffs, then the egg is beaten with the other ingredients. (3) Where a spongy texture is desired, the eggs are separated and beaten separately. **Classes of Egg Doughs**

For such mixtures as the first class lightness is not essential, is really undesirable; hence, the eggs are

beaten only enough to blend yolk and white, and not to mix air with them. In noodles, which are a kind of egg macaroni, the egg supplies liquid as well as aids in sticking the particles of flour together. After a stiff, smooth dough is made, it is rolled much thinner than would be possible if it did not contain egg. Then it is

Noodles

Pop Overs—an Example Dough Raised by the Expansion of Air.

cut in strips or fancy shapes and may be cooked at once or dried and used like macaroni.

Timbales

The timbale cases are made from a thin batter, in which, to egg and flour, milk and small quantities of fat and sugar are added, and the whole beaten together until smooth. If the batter is then allowed to stand until the air bubbles escape, the timbale cases will have fewer holes in them. The hot timbale iron is then dipped into the batter and the coating adhering is fried until crisp.

The second class should be hollow, and to secure this result the eggs are beaten without separating yolk and white, or better still, are dropped in with the other ingredients and all beaten together.

Popovers

Popovers are the result of a very thin batter, usually one cup each of flour and milk, one egg, and a little salt. This is beaten thoroughly together with a Dover

SPONGE CAKE.

beater, poured quickly into greased cups, iron or earthen, and baked until thoroughly done. Yorkshire pudding is a similar combination.

Cream Puffs

Cream puffs have a cooked foundation of water, butter and flour; to this when cool the eggs are added and beaten into it one by one. Because of the scalding of the flour this is a stiff mixture and will keep its shape when dropped on flat pans, and will puff while baking. The same mixture, fried in deep fat, produces a hollow fritter which may be filled like a cream puff.

Spongy Mixtures

For the third class of egg doughs and for meringues and puffy omelets, the whites of eggs are beaten by themselves and mixed with special care into the other ingredients that none of the air which has been entangled may be lost. This air expands when heated, producing the delicate lightness of the meringue, or sponge, or angel cake.

Beating Eggs

The use of a whisk on a platter is the best way of quickly converting the slippery egg white into a frothy, flaky mass, so firm and dry that it may be turned upside down without slipping from the platter.

Egg beaters are not absolutely essential, for the work may be done with a fork in time. The whisks are best for beating whites alone—those with cog wheels for the whole egg or for beating batters.

When yolk and white are mixed, it is impossible to beat in as much air as into the white alone, probably because of the oil contained in the yolk. Even a very little of the yolk will prevent the whites from becoming a stiff froth.

Cooking

Popovers, meringues, and sponge cake, like other articles containing large proportions of egg, require long cooking at moderate heat. When taken from the oven too soon they shrivel out of shape.

It is not wise to make cheap cakes and try to make baking powder take the place of eggs in making the mass light. When eggs are cheap, make good cakes and custards, but when they are high in price, depend upon desserts where they are not required.

FISH, FOWL, AND FLESH.

Two important animal products, milk and eggs, have been studied, and we come now to a consideration of the flesh of animals as food. The cooking of the flesh in any way is a comparatively simple matter once we have mastered a few fundamental laws which are practically the same as in cooking eggs.

The choice of different sections of a creature for different purposes and the decision as to best ways of cooking whatever cut happens to be available, are less simple.

The primitive cook applied heat to his fish, fowl, or section of meat and consumed it when cooked. The modern marketmen first divide and clean, then the chef seasons and applies the heat in different ways to the various portions. One part is naturally tender and ready for immediate cooking, another will be better if kept a week or a month, others will be improved by salting or smoking.

Savages have fewer kinds of food and simpler methods of preparation than civilized man. Because of greater abundance it is a natural tendency in civilization to discard as refuse certain portions formerly eaten. On the other hand, business competition makes it necessary to save all by-products and every portion of an animal is used for some purpose and brings some money return, even though small. Were it not for this, our animal foods would be higher in price

than they are. As it is, they are the most expensive part of the daily food.

Meat a Secondary Product

This is partly due to the fact that the flesh of animals is a secondary product. Animals consume grains and require additional human care, and thus must cost more than the grains, themselves, alone. Moreover, it has been learned by dietary studies that average families in the United States obtain from half to two-thirds of the protein in their food from animal source, and the cost of food is usually proportionate to the demand.

Comparative Composition of Animal Food

The composition of all animal foods is similar. Milk is mainly water, but contains some of each of the food principles. Eggs have less water than milk, and no carbohydrates, but furnish larger proportions of fat and protein. Fish would average about the same proportion of protein as eggs, but rather less fat. Poultry yields more protein than eggs, but about the same amount of fat. The flesh of the larger animals will average about two-thirds water, the protein and fat being in varying proportions according to the age and condition of the animal.

Costs of Meat

Without regard to the names given by marketmen of different localities to the cuts of meat, we may learn the location of the choicest pieces. Cuts which offer tender muscle or large proportion of muscle will naturally command the higher prices.

In any of these animals the framework of bone is practically the same. The larger portion of bone is

in the forequarter. This is one reason why the forequarters are cheaper than hindquarters in our markets. Consequently, there is less nutritive value per pound and what there is is less accessible, for the meat is not easily carved unless boned before cooking.

Judging Meat

Meat of any kind should have little odor when in good condition. It should be firm and dry rather than

LAMB CHOPS AND KIDNEYS.

moist, and should be well marbled with fat.

The lower part of the legs will have little muscle in proportion to the bone, and there will be tendons holding the muscle to the bone.

Toughness

Muscles getting little motion or exercise will be tender, while those which are active will be tough, though juicy. The neck and legs, therefore, will be suitable for broths but not desirable for roasts.

A general rule is this: the market value of meat increases backward from the head, but decreases down-

ward toward the legs. This brings the choicest cuts in the back upper part of the creature and includes the rump and loin.

The muscle of good beef is dark red when first cut and grows brighter when exposed to the air for a short time. The fat is yellowish white.

Mutton and Lamb

Mutton and lamb have a hard white fat. The flesh of mutton is a duller red than beef. The lamb is pinkish in tinge. The bones of veal and lamb are smaller than those of beef and mutton. Veal and fresh lean pork are somewhat the same shade of dull pink, but the pork has more fat mixed with it.

Meat from young animals is tender but not so nutritious, and does not keep so well as that from older ones.

The heart, liver, sweetbread, kidney, tripe, are also used as food and the same general laws govern the methods of cooking them.

The chef may not recognize the same elements in meat that the chemist does, yet his choice and preparation of a cut of meat are based upon its composition. From this point of view, meat consists of three parts: lean muscle, fat, and bone, and the market value of any cut is based upon its relative proportion of these.

Lean meat is most desired and tender fibres command the higher prices. Some fat is utilized with the meat, but a large part goes to the manufacture of artificial butter, lard, and soap. Much of the bone is

refuse, but some of its substance may be extracted by right treatment.

The lean portion of meats is about one-fifth or twenty per cent. protein about five times as much as in an equal weight of milk.

Preparation

The muscle or the lean meat may be freed from skin, gristle, bone, and fat, wholly or in part before cooking. It is easier to serve when this is done, and there is no waste at the table, but there may be loss of flavor. Raw meat may be digested readily, but we cook it to make it more attractive in appearance and more appetizing in flavor.

Some Fat Needed

Some fat is required to keep the meat from drying during the cooking process. Often the muscle is so closely associated with bone, tendon, and gristle, that to remove them would cause serious loss of juice. In any case, when the tougher portions are removed they should be used for stock and their flavor returned to the muscle as a sauce or used for soup or other good purpose.

Tender muscles may be cooked quickly—steaks and roasts—and should be exposed to intense heat at first.

Tough Meat

Tougher portions may be made more palatable by pounding to separate the connective tissue, but this is often accompanied by loss of juice, or they may be put through the meat chopper or cooked slowly for a long time in a gravy, or both.

Browning

By browning tough meat first we give it a good flavor and sear the surface so that more of the juice will

be retained than if raw meat were used. Some scraps of fat may be browned, an onion sliced and fried in the fat, an equal measure of flour added, and when it is mixed smoothly with the fat, water is put in, in the same proportions as for white sauce. The meat is put in the gravy and left covered on the back of the stove to cook slowly, later vegetables are added.

Braising Braised meat and pot roasts are similar in effect, but large pieces of meat are used and more time is required. All the trimmings, except the fat, are put with the bones, covered with cold water and the kettle is set on the stove to heat slowly.

Salt Meat Salt meats should be cooked slowly in plenty of water until tender. When the meat is very salt, it should be put on in cold instead of boiling water.

Fatness Wild animals usually are less fat than those that have been raised for food. Excessive fat may mean disease. Young animals have but little fat compared with older ones. Half the weight of a pig may be fat and a fourth of a fat sheep or ox. Some portions of a creature will contain much more fat than others. Layers of fat occur around the inner organs of animals. Some fish have fat or oil in the liver and little or none elsewhere. Fat mingled with the lean tissues is partly visible, partly detected only by chemical methods.

To a certain extent fat takes the place of water in the tissues. In fat meat the purchaser gets the same amount of protein but buys fat instead of water.

Saving the Fa

The surplus fat purchased with meats should be turned to good account by clarifying it for shortening or frying. It should be freed from the protein matter as far as possible by trimming and soaking in cold salted water. The water should be changed often, and the fat, after being cut in small pieces, may soak from twelve to twenty-four hours. Then it is drained and

SAUSAGE AND FRIED APPLES.

heated slowly to separate the clear fat from the heavy, honeycomb-like tissues which contain it. At the end of several hours the fat will have melted and may be strained from the crisp brown tissues. If raised to too high a temperature the fat is less wholesome and well flavored.

In the average household, trimmings of beef, pork, veal, lamb, and poultry, may be prepared together for

fry fat, and where much meat is used will keep a supply in the frying kettle.

Frying in Deep Fat

Frying in deep fat is a satisfactory method of securing a crisp, brown crust. When the process is properly conducted very little fat is absorbed by the food.

The temperature of fat suitable for cooking is much higher than that of boiling water and ranges from 300° to 400° F, according to the nature of the article to be cooked. For doughs which should rise, and fish which must be cooked through, a lower temperature and longer time are required than for fishballs or croquettes, already cooked and only to be browned.

If many pieces of cold food are put into the kettle of fat at one time, the temperature will be lowered so much that they may absorb fat and even fall to pieces.

Testing Temperature

A bit of bread dropped into the kettle will brown in one minute if the fat is right for frying doughs, and in less time if it is ready for croquettes.

Fat by itself does not boil, but when moist food is put into it large bubbles of steam begin to form. At first the foods being cold and heavy sink to the bottom of the kettle; as they warm and the water escapes, they rise toward the top.

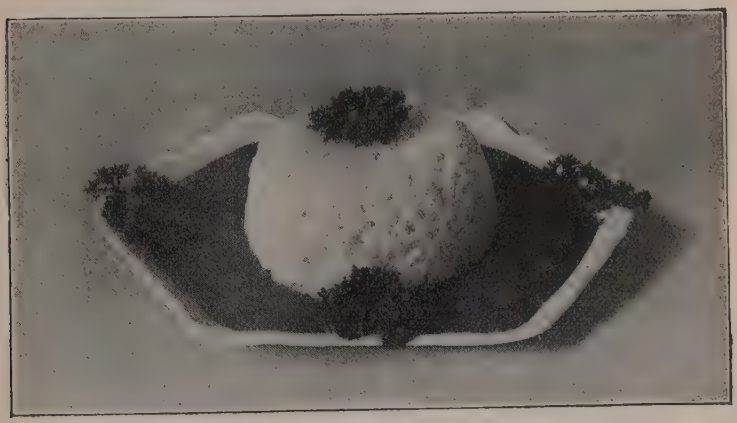
As soon as the food is brown it should be removed from the fat and drained on soft paper before serving.

Bones

The bones of animals yield considerable nutritive material if we use proper methods to extract it. Mar-

Extracting Nutriment

row is found in the leg bones, but they have not so much protein matter as the spongy rib bones. When meat is boned before cooking, bits of meat cling to the bone. By soaking in cold water, then cooking gently, a large part of the flavor and nutritive part of the bone is dissolved in the water. Cartilage, gristle



MEAT LOAF IN RICE.

and tendons are also somewhat soluble when exposed to moisture and heat. The smaller the pieces into which bone and meat are divided the greater the surface exposed to the dissolving action of the water. The flavors of meat which are drawn into the water are known as extractives and are stimulating rather than nourishing.

Soup Stock

This process of extraction from portions unsuitable to eat is known as making soup stock. Bouillon and beef tea are made from tough lean meat with little

FILLET CUT FROM SIDE OF FISH.

or no bone. Consommé is made from meat and poultry together. Anything that would give a strong flavor must be removed. The skin of lamb or beef should be thrown away.

Names of Soups

The flavoring of the soup or the garnish served in it gives its distinctive name. All meat, poultry, and fish soups have as their basis a stock made from the portions undesirable to use in any other way.

Yet stock contains but a small proportion of the nutriment of the meat, and fibre of the meat from which stock has been made may be used for hashes, with herbs, etc., to give flavor.

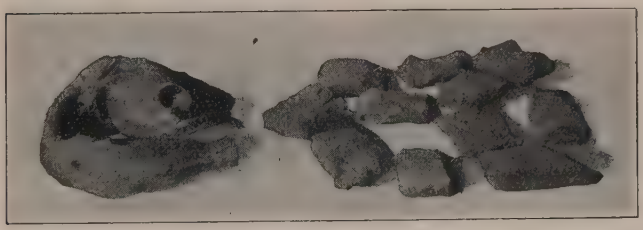
FISH.

Proper Appearance

Fresh fish have full lifelike eyes, red gills, silvery, not slimy skin and scales, firm tail, not flabby and drooping, and firm flesh. Plump short fish are better than long thin ones of the same variety. The time of their transfer from the water to the table should be as short as possible. While fish as a whole is not so nutritious as meat, it may often take the place of meat on our tables. It is the province of the cook to supplement the fish with such sauces as will supply both flavor and nutriment.

Methods of Cooking

In general, the methods of cooking fish are the same as those followed in cooking meats. The flesh should be thoroughly cooked, but not overdone. Oily fish, like



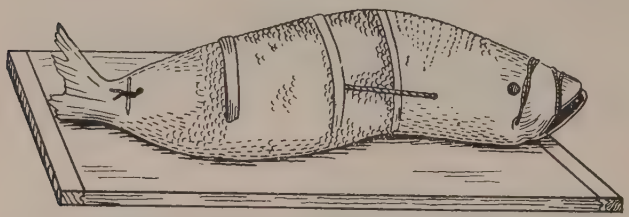
PREPARATION OF FISH.

For Fish Stock. Ready to Fry

salmon and mackerel, are best broiled. Almost any fish may be baked whole or in fillets. Boiling is an extravagant method of cooking unless the water is used for a soup or a sauce. Steaming is better than

boiling, as more of the flavor is retained in the fish. Frying in salt pork fat is a desirable way to cook fish lacking flavor or fat, but for uniformity in cooking the kettle of deep fat is to be preferred to the thin layer in a shallow pan.

If a fish lacking in fat is brushed over with oil or melted butter and broiled under gas, the result gives the best effects of frying without the disagreeable odors.



FISH STUFFED AND TRUSSED FOR BAKING.

Fish stock may be kept for several days if convenient, or it may be used as the basis of a sauce to serve with the fillets of the flesh.

Sauces with Fish

Since so many varieties of fish lack fat, rich sauces are generally considered a necessary accompaniment. The composition of the fish and the way in which it is cooked should decide the kind of sauce to be served with it. Acids like lemon juice, pickles, and tomato are often agreeable additions to a fish sauce.

POULTRY

Judging

Young birds are to be chosen for broiling and other quick cooking, but full grown fowls are more nutritious for broths and stews. A fowl is usually fatter than a chicken, the skin is tougher, and the bones—especially the tip of the breast bone—are harder. In the skin of the young bird there are usually pinfeathers, the feet are smoother, and the muscles or flesh are less well developed than in the fowl.

Preparing Fowl for Fricassee

To prepare poultry, pick out pinfeathers, singe and rub off the hairs and wipe clean. Cut through the loose skin on the back, pull away from the neck, take out the crop and windpipe in front, cut off the neck.

Cut through the skin on the legs about an inch below the joint, break the bone, twist the leg and pull out the tendons one by one. Take off the wings and cut through the loose skin on the sides and separate the leg and thigh joints.

From backbone to tip of breastbone cut through thin muscles on either side. This exposes the interior organs so that it is easy to learn their relative positions. Then one knows how to proceed when preparing a bird to roast when the opening is small.

Loosen the membranes which attach these organs to the body, following the breastbone with the fingers until the point of the heart is felt. Then remove heart, liver, and gizzard together. The gallbag is protected by the liver, so there is little danger of breaking it if

A FOWL CUT UP FOR FRICASSEE.

they are not separated. The intestines should be removed when the fowls are dressed for market.

Next detach the lungs from the backbone near the wings, and the kidneys, which are lower down in the back. These are not used.

Separate the gallbag from the liver without breaking, and cut away any portions of the liver which are tinged with green. Cut across the larger end of the heart and slip it out of the membrane enclosing it. Cut through the gizard on the wide side and take out the inner portion without breaking, if possible.

Order of Removal

Learn the order of removal of these portions from the body, and then nothing will be forgotten when preparing a bird for any purpose,—the crop and windpipe from the neck.

The heart, liver, and gizzard, together, from an opening near the tail.

The lungs and kidneys from the hollows in the backbone.

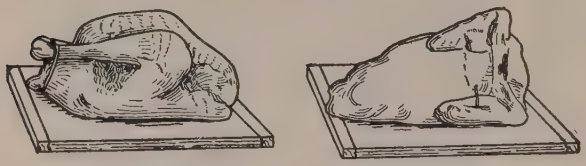
The oil bag on the upper part of the tail.

The backbone can now be divided near the middle, and by slipping a knife under the sharp end of the shoulder blade and then cutting through the ribs from the point where the wings come off, the upper part of the back is separated from the breast.

If desired, the fillets of white flesh can be separated from the breastbone and wishbone by running the knife close to the bones.

Never soak a fowl in water, as is often the practice. If any parts need washing rinse them off quickly one by one.

The breastbone, upper part of back and neck, and sharp ends of wings should be put in cold water and



CHICKEN STUFFED AND TRUSSED FOR ROASTING.

heated slowly; thus more flavor is extracted from these portions which have but little meat.

Put in Boiling Water

When the water is boiling hot the other sections are put in and the hot water coagulates the juices on the outside and thus more flavor is retained. To accomplish the same end, the joints are often browned in hot fat and then are stewed afterward.

VEGETABLES AND GRAINS.

Like the foods already studied, vegetables are mainly water, but all the five food principles may be obtained from the vegetable kingdom. Here we secure our supplies of starch and sugar, or the carbohydrates, but the proportions of proteid and fat are, as a whole, smaller than in the animal foods. From fruits, vegetables, and grains we obtain mineral substances valuable for making bones and teeth and keeping the whole system in good condition.

Softening Cellulose

The woody fibre or cellulose, abundant in vegetable structures, is the great obstacle to be overcome by cooking. Plants growing rapidly with plenty of water and sunshine usually have less of this fibre, and it is the aim of the gardener to eliminate it as far as possible. By improved methods of cultivation the agriculturist has removed the acrid flavors of the natural vegetables and has reduced the proportion of woody fibre.

The cell walls cannot be separated wholly from the nutritive substances they contain, and unless softened by cooking may irritate the alimentary canal so that the whole is hurried through before digestion is completed. Cellulose, though of little food value, may aid digestion by providing the necessary bulk for its mechanical processes.

Experiment. To get a clear idea of the structure and composition of vegetables, grate a portion of a

potato or turnip. Let the pulp fall from the grater into a strainer placed over a glass and press out all the watery juice possible. Some of the starch of the potato will settle from the juice, and more may be washed out of the mass remaining in the strainer. The presence of sugar in the juice of a carrot may be recognized by tasting it after evaporation.

By examination of the woody fiber left in the strainer we see how closely it is connected with the starch and sugar, how impossible it would be to separate it, and the necessity for softening it that we may be able to digest the nutrients.

We discard portions of vegetable foods, the pods, husks, cobs, etc., because of our inability to cook them so they can be digested.

Chopping and straining aid the cook in dividing the cellulose so that the particles are less irritating and the nutrients are more accessible.

Parts of Plants Used for Food

It is interesting to note the different parts of plants which are used for food—the roots, tubers or bulbs, stems, leaves, fruits, and seeds. The last are used mainly in the dry form, and absorb much water in preparation. This must be remembered when studying analyses of dried legumes and cereals.

The botanical grouping of plants is helpful. Once we have learned how to prepare and cook one member of a plant family we have something to guide us with its relatives. Among the principal classes to study in

this way are the pulses, the grains, and the cabbage family.

There are many kinds of each vegetable offered by the seedsmen. Moreover, any vegetable differs materially in different years and at different seasons of the year.

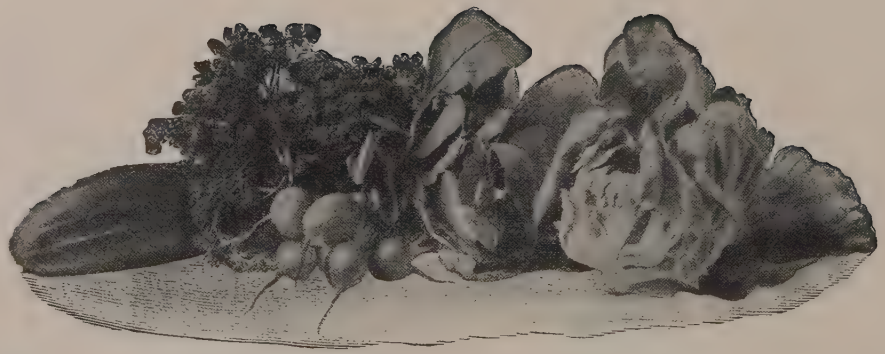
From the standpoint of the cook a convenient classification of vegetables may be made according to the general preparation, the time, and the amount of water required for cooking them.

Dried Vegetables

Dried vegetables must have abundant water supplied and must be allowed time to soak, thus absorbing an amount of water similar to that lost in the drying process. There is little difference aside from the fat added in cooking, in the analysis of the dry bean which has been soaked and baked, and that of the green shelled bean. Sometimes we try to hasten this process of absorption by heat, but the best results are attained when dried fruits or vegetables are soaked until at least double in size before cooking.

Strongly Flavored Vegetables

Old or strongly flavored vegetables, such as potatoes, turnips, and onions, will be improved by the removal of the skin and any imperfections before cooking, and by soaking in cold water for an hour or two. Inferior onions may be scalded in soda water before cooking, and by changing the water once or twice during the cooking process will be rendered less strong in flavor. It is wiser to make the vegetable palatable



SALAD PLANTS.—Cucumber, Parsley, Radishes, Cabbage, Lettuce.

at the risk of some loss of nutriment than to retain everything and have it uneatable.

Young vegetables in summer and those having sugary juices, like squash and beets, should be cooked in little water or by steaming or baking, so that all their sweetness may be retained, unless the water is reserved for soup or used in a sauce for the vegetable itself.

Young Vegetables

Slightly wilted vegetables may be improved by washing and soaking or by wrapping in a damp cloth and placing in the refrigerator or by hanging in a draft of air.

Wilted Vegetables

The pulses or leguminous plants include the bean, lentil, pea, and peanut.

Pulses

In the bean we have an example of a vegetable which differs much at different stages of growth. We may use the pods before the seeds they contain have reached their normal size, the full grown seeds may be cooked green, or dry after first being soaked.

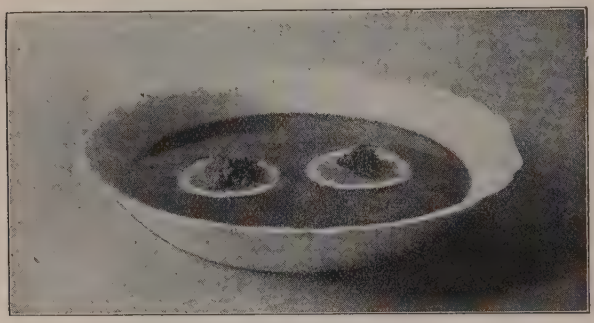
This class of plants is of great value where people must be fed at small expense. They are staples in in China, Japan, Southern Europe and Mexico, are invaluable in prisons, charitable institutions, and for the pioneer or logger. Because they lack fat, cream, butter, or pork are added before eating.

Some varieties like the Japanese soy beans, contain as much as sixteen per cent of fat, and peanuts are more than one-third, or about forty per cent fat.

Fat Contents

Digestibility

Though rich in nutrients this class of vegetables appears to be slow of digestion. The ease and completeness of digestion are aided by thorough cooking and by removing the skins, grinding, mashing, or straining. Long, gentle cooking develops new flavors and removes the peculiar granular texture present in beans and peas insufficiently cooked, even after straining.



Black Bean Soup Garnished with Lemon and Parsley.

The main object in cooking beans, like all vegetables, is to soften the tough fibres of the pods of the string beans and the skins and cellulose of the dry ones.

Peas

Split peas have the skins removed and thus are more readily digested. The skins of the larger beans may be rubbed off after soaking and parboiling.

Hard water retards the cooking of beans and a bit of soda is often added to soften the water and loosen

the skin—this water is poured off when the beans are partly cooked.

Beans

Few people use the variety of beans they might, as the black beans for soup, the limas or red kidney for stewed beans, the pea bean and yellow eye for baking and the French flageolets for salads.

Potatoes

Potatoes are generally liked because of their lack of pronounced flavor, and for the same reason, may be combined with many other foods.

A peck of potatoes may cost from fifteen to seventy-five cents, according to the season of the year, and the abundance of the crop. This quantity will weigh fifteen pounds and will average from fifty to sixty potatoes. That is, one pound will be about four potatoes of medium size, and will cost from one to five cents.

Loss in Preparing

If pared before cooking and all bad places removed, average potatoes will lose from twenty to twenty-five per cent, or one of the four potatoes in a pound. From selected potatoes the government experts scraped the skins, removing as little flesh of the potato as possible. This was about eleven per cent of the weight. In potatoes as usually purchased, the green ends, decayed places, and the potatoes gashed with the hoe easily bring the total loss up to the higher percentage.

It may be a profitable loss to pare old and inferior potatoes before cooking. The main point to notice in the cooking of the potato is to let out the steam, or to

pour off the water as soon as the fibre and starch are softened.

Potatoes with Meat

Because the potato is lacking in protein and fat, the instinct of man has taught him to eat it with meat, since it gave him the food principles the meat lacked, and also the bulk desirable for the process of digestion.

The art of the cook has devised many methods of combining butter, oil, milk and eggs with the potato and other vegetables to supply protein and fat. The fried potato absorbs fat while cooking; the white sauce of creamed potato adds both fat and protein; a potato soup is creamed potato with more milk; the potato croquette contains egg and is cooked in fat; a potato salad has oil and often eggs.

Such additions, though increasing the cost of the food, make the result equivalent to vegetables with a moderate allowance of meat. Hence vegetable soufflees, or croquettes, may be served when the meat supply is limited.

Combinations

Almost any vegetable, by due combination with milk, butter, and eggs may appear as soup, fritters, croquettes, soufflees, or salads. For these complicated dishes, it is essential that the vegetable first shall be perfectly cooked in a simple fashion.

Cooking Vegetables

The methods of cookery applied to vegetables are similar to those used for meat, but must be adapted to the composition and condition of the individual specimen.

It is impossible to give the exact time for cooking any variety of vegetable, for every sample will differ. They are unpalatable when underdone and also at the other extreme.

There is usually some way of cooking best for each vegetable, but if one kind only is available it is necessary to serve it in a variety of ways. This, perhaps, explains why the average cook book gives more receipes for the potato than for all other vegetables. Suitable utensils are essential; vegetables should not be cooked in iron kettles when others are attainable; strainers, mashers, cutters, ricers and presses are desirable.

Preparation

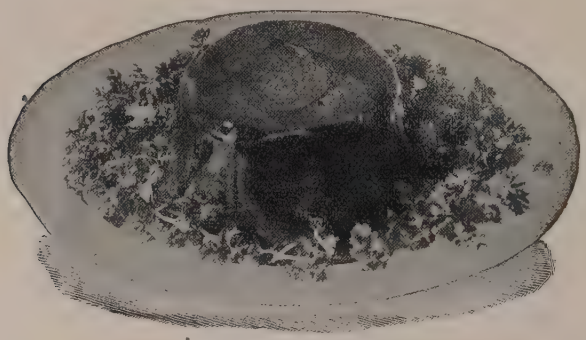
Strong flavors frequently are due to careless preparation. Careful trimming and thorough washing are essential. Wilted vegetables are improved, as has been said, by soaking. Salad plants need especial care in washing to remove parasites and insecticides.

Any portion of a root or tuber grown above ground becomes green and strong flavored and will impart its flavor to other portions with which it may be cooked. A decayed bit, or the scorching where the water evaporates, may often ruin the flavor of all.

Young, tender, well flavored vegetables should be cooked and served in the simplest manner. Inferior specimens, like tough asparagus or celery which has lost its crispness, by boiling, straining, and flavoring may be made into palatable soup when they would be worthless under simple treatment.

Vegetable Soups

Vegetable soups are of two types;—for one, the vegetables are cooked till tender, cut in convenient bits and added to a meat stock. For the other, by long cooking in water a single vegetable or several together are made into stock, and all that is soft enough is rubbed through a strainer and then put with about an equal quantity, according to the strength of each, of



TOMATO JELLY WITH BEETS.

meat stock or thin white sauce. Thick, pulpy stock, like that from peas, beans, or potatoes, needs a much thinner sauce than would celery or asparagus. Unless some thickening of flour is used, the solider portions will settle, leaving the soup watery on top.

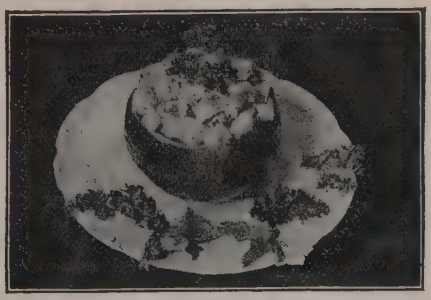
Preparation and Digestibility

In one of the publications of the United States Department of Agriculture the difference in digestibility of the same food cooked in various ways is thus stated: Whole peas soaked and cooked, 60 per cent digested;

peas cooked a long time and strained, 82.5 per cent; pea flour cooked with milk, butter and eggs, 92 per cent. This would seem to prove that the portion of vegetable food considered undigestible can be reduced by right methods of cooking.

Mashing

Mashing is a form of preparation suited to squash, turnip, parsnip, and potatoes. A seasoning of cream,



INDIVIDUAL APPLE AND CELERY SALAD.

or butter, and salt and pepper, is usually added. Fritters and croquettes usually have mashed vegetables as their foundation, or small bits are mixed with a thick cream sauce.

Creamed Vegetables

The white sauce is a useful additon to vegetables since it increases their nutritive value and modifies strong flavors. Almost any cooked vegetables may thus be "creamed" or "scalloped" by adding both the sauce and buttered crumbs and baking. This is an excellent way to reheat something left from a previous day.

Salads

Salad is a term belonging especially to a class of uncooked vegetables and in all cases implies a vegetable foundation though meats or fish may be added. The dressing of oil and vinegar is likewise of vegetable origin.

Here is another of our attempts to bring together the five food principles in a single compound. Water and mineral matter, protein, fat, and carbohydrate are usually blended in fairly balanced proportions. This is especially true of salads containing eggs, fish, or meat and eaten with bread.

GRAINS

The grains or cereals are the main dependence of the human race for food and have been known from very early times. Some member of this family of plants is found in every section of the world. Rice, wheat and corn are most largely used as food, while oats, rye, barley, and millet follow closely. Animals can eat these grains or grasses as they grow. For the human stomach the coarser portions must be removed. All are similar in composition, being from two-thirds to three-fourths starch. The protein ranges from 7 to 15 per cent; fat varies from 1 to 10 per cent; there is about 1 per cent mineral matter and 10 to 12 per cent of water.

Addition of Water

Before we can eat and digest such foods a large amount of water must be combined with them. Analyses have shown that the percentage of water in mushes,

boiled rice, macaroni, and mashed potato is nearly the same.

When we buy cereals in paper packages we pay a little more for them than when they are bought in bulk, but that is a convenient, clean form in which to keep them. All cereals should be looked over before cooking since they are liable to attacks from insects.

A Cup of Corn Meal, and the Amount of Mush It Will Make.

Mushes

To make mushes start with the desired proportion of liquid, as that regulates the final amount. If too much water is used it can seldom be drained off, as it might be from potatoes, and if there is too little at the beginning it is practically impossible to add more without making the mush lumpy and pasty. A double boiler, a dish set in a steamer or a covered pail in a kettle of water, are the utensils suitable for cooking mushes.

Cooking Cereals

The coarser the grain, the more water required, and the longer will be the time of cooking. Whole grains are improved by soaking in cold water, finely ground preparations must be mixed with cold water to prevent the formation of lumps. All others should be put into boiling water. Add one teaspoonful of salt to each quart of water. Ordinary oatmeal and granulated wheat need four times their bulk of water, cracked wheat and hominy require more. The rolled grains require but twice their bulk of water.

The cooking at first should be rapid and the upper part of the double boiler should be placed directly on the stove for five minutes. Then put it over the other part, cook closely covered and do not stir. Such foods are not injured by cooking for a longer time than the usual directions allow. Coarse hominy, oatmeal, or cracked wheat for breakfast should be cooked several hours the previous day.

Rice

Rice may be boiled in a quantity of water which is afterwards drained off, but this is wasteful unless some use is made of the liquid.

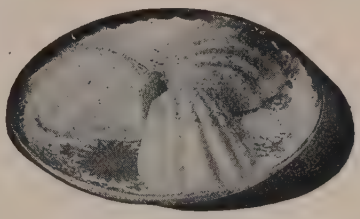
Macaroni and tapioca are not strictly cereals but conform to the same rules of cooking.

Fried Mush

Most mushes or cooked cereals may be moulded and served cold for variety, especially in warm weather, or be packed smoothly in oblong pans or round tin boxes and when cold sliced and fried to serve with syrups or to eat with meats.

A portion of cooked cereal may be added to the liquid used in mixing muffins.

Manufacturers of the present day seem to be trying to see in how many different forms they can prepare the few standard grains; they are left whole, are cracked, are crushed into flakes, or broken into granules. As the result of this variety of preparations and



Cereals shaped in Fancy Moulds.

the generous way in which they are advertised cereals are used more and more.

"Ready to Eat" Cereals

During the last few years they have been cooked in the factories and prepared in forms ready for immediate use. These forms have many merits though not all that are claimed for them. In some respects they resemble the primitive forms of unleavened bread which were the first attempts among all races, the bannock, the hoe cake, the tortilla.

PRINCIPLES OF COOKERY.

PART II.

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. *Do not copy answers from the lesson paper.* Use your own words, so that the instructor may know that you understand the subject. Read the lesson paper a number of times before attempting to answer the questions.

1. In what ways are eggs used in cookery?
2. What substances are naturally combined with eggs and milk, and why?
3. What is the fundamental principle in cooking articles containing a large proportion of egg?
4. Mention five dishes where egg is an essential ingredient, and five others where it may be used or omitted. Explain why.
5. If we find it necessary to reduce the number of eggs in a cake or custard, what other changes would be necessary?
6. Make a two days' menu for the season when eggs are at the lowest price, and two days' menu for the season when they are expensive.
7. Which forms of animal food are the most expensive and why?
   Which most economical and why?
8. What portions of meat are best for soup stock? What should be discarded? Describe the process of making soup. Has the extracted meat nutritive value?

9. Why is less fat absorbed by food in frying in deep fat than in sautering?
10. Give methods of preparing tough meat so that it is palatable and nutritious.
11. Give the names of soups which have (a) little, (b) much, and (c) great nutritive value.
12. Why do we add stuffing and sauce to meats and fish?
13. What is the greatest obstacle to be overcome in cooking vegetables?
14. Give methods for cooking fish. What is the proper appearance of a fresh fish?
15. Plan a rotation of different cereals for five breakfasts in winter and five in summer, giving reasons for your choice.
16. How may different methods of preparing a vegetable change its nutritive value?
17. Describe your own method of roasting meat.
18. Give the names of the vegetables and grains used in your household. Name some that are not used.
19. Is there any question you wish to ask or subject you would like to discuss relating to this lesson?

NOTE.—After completing the test, sign your full name.

PRINCIPLES OF COOKING

PART III

STEAMED PUDDING, CHRISTMAS DECORATIONS

PRINCIPLES OF COOKERY

PART III

BREAD AND OTHER DOUGHS

Order of Mixing Ingredients

Having considered the whole grains we must learn how to use them when ground into flour. Although some forms of bread like hoe cake and tortillas can be made from cracked grain without making it into a flour, most people depend upon flour for a large part of their daily food.

In the best cook books the ingredients are mentioned in the order in which they are to be put together to secure the best results and to save dishes; the dry cups and spoons are used for the flour and spices, then for the shortening and liquids. The flour is sifted before measuring and sifted again to mix the other materials with it.

General Proportions in Doughs

There is such variation in flours that it is impossible to give exact recipes for doughs, but it is easy to learn certain general proportions and experience must teach the rest. A simple formula will be helpful in interpreting old recipes in which the exact quantities of flour or liquid are not stated, or in analyzing recipes to decide whether they are doughs or batters.

One measure of flour to one of liquid makes a batter.

Two measures of flour to one of liquid gives the usual muffin mixture.

Three measures of flour to one of liquid makes a soft dough, but one that may be kneaded.

Four measures of flour to one of liquid is the usual proportion for doughs to be rolled thin like pastry or cookies.

Batters and muffins can be stirred with a spoon. Doughs are mixed more thoroughly and easily with a knife.

Doughs are made light because thus they are more palatable and digestible.

Making Doughs Light

The almost endless variety of breads, cake, and pastry may be classified according to the means used to make them light. Yeast has been known to the human race from a very early period, the others are much later inventions.

The principal means are these:

The mechanical introduction of air, as by beating or by the addition of eggs or by the folding of pastry, or in the aerated or Daughlish bread.

The use of yeast, the growth of a plant filling the dough with gas.

The chemical combination of a bi-carbonate of soda, with some acid substance.

Yeast

For practical use in every-day life it is essential to remember that yeast must be treated like other forms of plant life and if we want it to grow, we must provide the right kind of soil, sufficient moisture, and suitable temperature. After its work is done, the vitality of the yeast must be destroyed by heat.

Yeast Cakes

It may be desirable to know how to manufacture yeast at home and how to utilize the dried yeast cakes in emergencies, though compressed yeast cakes are now so generally used that it is hardly necesary. A compressed yeast cake should be firm and solid, not soft and pasty; it should look something like fresh cheese, not dark colored and moldy. When only part of a

USEFUL UTENSILS.

yeast cake is to be used, it should be cut off squarely and the remainder wrapped smoothly in tin foil again; when it may be kept a few days longer.

BREAD

The essential ingredients in bread making are yeast, liquid, and flour; the proportions may be varied according to conditons.

Sugar and shortening are commonly used, but if they were omitted wholly it would be possible to have palatable, nutritious bread. Salt is essential to suit the taste of most persons, but as bread is usually combined

with salted butter its absence would be less noticeable, and bread might be made without it. Fermentation is hindered by the presence of salt, a small amount of sugar hastens the process.

Causes of Slow Rising

Sugar in large quantities makes the dough dense and the yeast cannot expand so readily. An excess of shortening has much the same effect. If a dough is made stiff with flour it rises more slowly. A stiff dough usually has small air cells and is finer grained than when the dough is made softer.

The liquid may be milk, whole or skimmed, or water, or half of each. The milk supplies some sugar, fat and nitrogenous matter and produces a more nourishing loaf than that which is made with water. Mashed potatoes or sifted squash or cooked cereals are sometimes added to a bread dough for variety, but the process is not changed by such additions.

Kinds of Flour

The best bread flour is made from spring wheat and pastry flour from winter wheat, though they may be used interchangeably if necessary. The spring wheat flour contains more gluten and less starch, so that less of the bread flour is required to produce a dough of a given consistency.

The entire or whole wheat flours provide more bone making materials than white flour, otherwise there is little difference in the nutritive value of the better grades of each.

The presence of gluten makes wheat the favorite flour for yeast dough. Gluten is adhesive when moist-

ened and thus retains the gas bubbles formed by the yeast in somewhat the same way that egg-whites hold air when they are beaten.

Order of Mixing

Old recipes for mixing yeast bread usually give directions for rubbing shortening into the flour and then

"BREAD CAKE" OR BUN BREAD.

adding the other ingredients with liquid to make a dough that can be kneaded. The best authorities today reverse the order, thus saving time and energy and producing a better result.

Liquid Warmed

The liquid is warmed that the fat, sugar, and salt may readily blend with the other ingredients and that the dough may rise more rapidly. When it is below 100 F, or cool enough to avoid cooking the yeast, that

is added and well mixed through the liquid. Sufficient flour then is mixed in to give the desired consistency for kneading.

At first the mixture may be stirred with a spoon, but as it becomes stiffer a knife will more easily serve to produce a smooth dough.

Double Process Bread

The process of mixing bread may illustrate the batter and drop batter or muffin mixture as well as the dough. To make a sponge, half the quantity of flour to be used is mixed with the liquid and this allowed to rise till foamy, when the remainder of the flour is added. The advantages of this double process are that a trifle less flour is required since the first has time to expand before the second is put in, and that the process is somewhat shortened because in the first stage there is less resistance for the yeast to overcome and the whole sponge becomes full of yeast for the second stage.

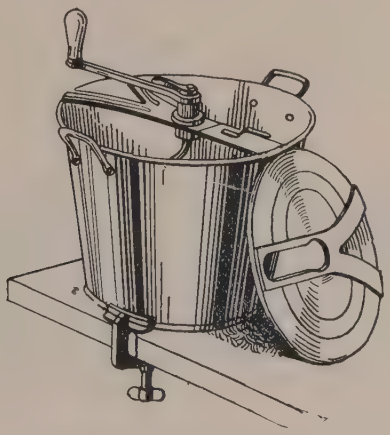
Amount of Yeast

Sometimes it is more convenient to use a small portion of yeast and allow the dough to rise for a longer time, and again to use more yeast and thus do the work more quickly. Until the scientists decide which is really the better method, the housekeeper will find it desirable to vary the quantity of yeast according to her conditions. Time, temperature, and quantity of yeast must be considered,—if one must be diminished, the others should be increased.

Short Process

For common use, a short process is to be preferred to the old custom of letting the dough rise over night.

When it rises by day we can regulate the temperature and stop the process at the right time. One yeast cake to one pint of liquid and about three pints of flour, will make two medium-sized loaves of bread, which can be completed inside of six hours.



BREAD MAKING MACHINE.

Holding Dough in Check

When necessary, a dough well risen and ready to shape may be cut down and put in a refrigerator or other cold place and thus held in check for several hours without injury. Sometimes half the bread may be shaped in a loaf and the remainder in rolls and the pans containing the latter set away in a cool place for several hours before baking that they may be hot for a later meal.

Rising

When first mixed, dough is kneaded just enough to blend all ingredients, then it is put back in the bowl,

brushed over with water or with melted fat and covered while it is rising. Such precautions aid in preventing the formation of a dry crust caused by the evaporation of the water on the surface during the process of rising. The bowl containing the dough may be set in a pan of warm water which is changed often enough to keep the temperature even. When the dough must stand over night in a cool kitchen, the bowl may be wrapped in a blanket to prevent the escape of heat.

Kneading

Much time is doubtless wasted in kneading doughs, though it seems to be agreed that this process works all ingredients together and thus give a better texture to the bread. To knead work the edges of the dough little by little toward the center, pull it over, press down into the mass and press it away with one hand while turning the whole around with the other. When the dough is smooth, elastic, and rises quickly when pressed and does not stick to the hand then it is done.

After the dough is double in bulk it should be kneaded enough to redistribute the air bubbles which have run together and formed larger ones, and to shape it for baking. At this stage no flour should be added, for here much time would be required to work in a little flour, and that is why long kneading has been thought necessary. Dip the fingers in soft fat if the dough inclines to stick, as one would do when pulling candy.

Shaping

To shape biscuits or rolls, first make smooth round

balls, then by gentle rolling and pressure make the finger rolls—then farther extend till the strips can be twisted or left as sticks for soup. Thus one form may be developed from another.

When rolls are to be cut out and folded, the pressure of the rolling pin will equalize the air bubbles without previous kneading. Instead of making the dough for rolls rich with butter or lard, it is wiser to brush over the outside of the rolls with melted fat when they are put in the pan.

BUNS—SEPARATE AND IN LOAF.

Again the dough must be allowed to double in bulk and then it is ready to bake.

Summary

To summarize the points already covered.—The time required depends upon the quantity of yeast used, and the temperature at which the dough is kept. One measure of liquid to three of flour is the usual proportion. For fancy breads make a sponge first, and let the mixture rise three times. Large quantities of sugar and butter tend to retard the growth of the yeast plant. For bread add all the flour at once. Small shapes are

preferable to large ones, as thus more thorough cooking is insured.

Baking of Bread

The baking of bread is not easily disposed of in a few words. Yeast doughs having risen before being put in the oven will bear rather a higher degree of heat at first than other doughs. A more moderate oven is required for loaves than for rolls that the heat may penetrate evenly, but the loaf must remain a sufficient time to raise the center to a degree of heat that will insure the destruction of the yeast. A moderate temperature might allow the dough to continue rising and even to sour from the growth of bacteria when in the oven.

When thoroughly baked, a loaf of bread will seem light and hollow and no steam will come from it to burn the hand as it is turned from the pan.

The usual temperature for baking bread is about 400° F, though a good result may be reached by a more moderate heat continued for a longer time.

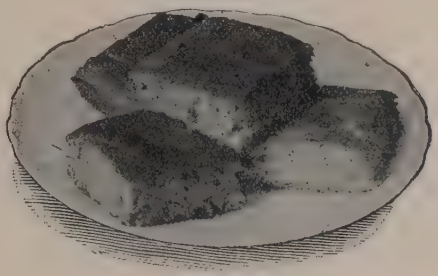
Cooking Soda with Acids

Experiment. Three or four glass tubes or common tumblers are all the apparatus needed for some practical experiments which will make the use of these leavening agents much clearer than does the ordinary cookbook. Dissolve some soda in half a tumbler of water; in another tumbler dissolve some cream of tartar, in a third have a little molasses; in a fourth place some sour milk, and in a fifth some vinegar.

Now put a part of the soda water into each of the other glasses, stir well, and watch the result. Leave

these till later to see how soon the gas escapes and that it cannot be revived. By tasting soda and cream of tartar we shall see that it is desirable to combine them in such proportions that each may neutralize the other. This is done in baking powders.

In another glass dissolve some baking powder, first in cold and then in warm water to show that the gas escapes more rapidly at a high temperature.



CORN BREAD.

These experiments show us why we should sift cream of tartar and soda or baking powder with the flour instead of dissolving it in liquid. The gas which is to make the dough light begins to escape from the soda when it comes in contact with an acid liquid.

Soda and Cream of Tartar

Some baking powder manufacturers try to convince us that their product is so perfect that it is useless for the housekeeper to continue to keep soda and cream of tartar in her store closet. But much as we owe to their perfect methods of grinding and sifting and combining

these substances in the right proportions, there are times when we must use them separately.

Angel cake, for example, requires the addition of cream of tartar to stiffen the egg-white which is its foundation. This aids in holding up the spongy mass until it is made firm by heat. In any case where there is a large proportion of egg-white a slight excess of cream of tartar is desirable.

Molasses and Soda

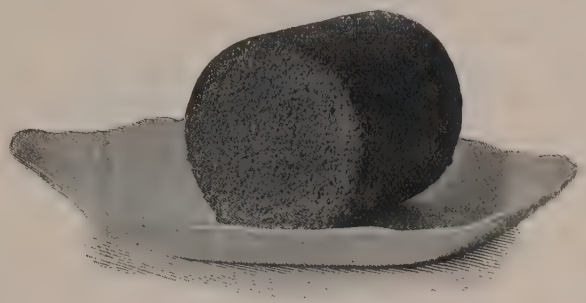
That molasses is acid in spite of its sweetness is evident by testing it with a bit of soda. For this reason soda is added to molasses candy since if it is filled with air bubbles it will be more brittle. The acidity varies in different grades of molasses, and modern methods of manufacture and quick transportation give us a less acid product than that of the past. This explains why many of the recipes of our great-grandmothers called for such large quantities of soda in gingerbread, etc. In such recipes it is usually wise to reduce the quantity of soda and use a small amount of baking powder. Brown bread and all cakes and puddings containing molasses, because of its acidity, are usually more palatable if some soda is used to make them light instead of baking powder only.

Butter contains so much buttermilk that, unless it is washed before using, a bit of soda is essential for all rich cakes and cookies which are to be kept for any length of time.

Sour Milk and Soda

Because of the tendency to use an excess of soda with it, the use of sour milk has been condemned. But

thick, sour milk is not very variable in acidity, and the use of one even teaspoonful of soda with each pint of sour milk is safe. Soda is inexpensive and sour milk is also, while cream of tartar and baking powder are costly. One half level teaspoon of soda is usually enough when one cup of molasses is used, as it is with one cup of sour milk. When it is more convenient to



BOSTON BROWN BREAD.

substitute sweet milk for sour, we retain the soda and add one slightly rounding teaspoonful of cream of tartar.

Strength of Baking Powder

Baking powder contains some starch, but two or three level teaspoonfuls of baking powder are equal in effect to one rounding teaspoonful of cream of tartar and the half level teaspoonful of soda.

Just why some good old recipes recommend dissolving soda in hot water before adding it to the other ingredients, or mixing it with hot molasses, is uncertain. Perhaps the housewives wanted to "see with

their eyes" that action would result. Or the habit might have been the result of the impure quality of the alkaline substance. The "pearl ash," as saleratus was called, was not as finely pulverized as is the soda of today, and may not have been as thoroughly purified from other ash. Hot water would dissolve it quickly, any impurities would settle, and even if some gas escaped enough was left to do the work of puffing up the dough.

Mixing Baking Powder

Such small quaniities relatively of soda, cream of tartar, and baking powder are used in a dough that it has been a question how they should be mixed with the other ingredients to secure the most perfect result. The dough should be light throughout, not here a solid streak, and there large bubbles.

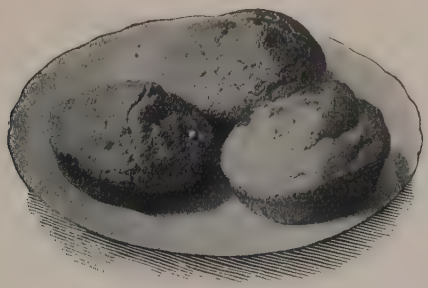
Some teachers of cookery have recommended sifting the one or two teaspoonfuls of baking powder over a cake after it was mixed and beating thoroughly just before pouring into the pan in which it is to be baked. But as soon as the powder comes in contact with the moist surface of the dough some gas will be lost, and moreover, it is doubtful whether two teaspoonfuls of baking powder can be evenly mixed through a quart of cake batter without much beating which does not improve the quality of the cake at that stage and delays the baking.

The accepted plan at present is to sift with the flour the baking powder or cream of tartar and soda or the

soda alone when it is to be used with some sour milk or molasses.

The sooner the process is completed after the acid and soda meet each other the better. Therefore we keep all the materials dry until the last moment, then mix quickly and bake at once.

Similar recipes are found in all cook books, and once the general proportions and the office of each ingre- General Directions



RYE MUFFINS.

dient are learned, it is easy to make many variations. The process of mixing is practically the same in all cases. Prepare the fire and dishes for cooking, before mixing any of the ingredients measure everything, sift all dry materials together, add liquids, mix all thoroughly, and cook immediately.

Changes in the proportions of materials often lead to a change in the manner of mixing them. For example, when a small quantity of shortening is used in batters, it may be melted and beaten in, but if a large Manner of Mixing

proportion is required, it should be rubbed till creamy and blended with the sugar as for cake, or mixed into the flour as in pastry making. For stiff doughs which are to be rolled, it is essential that the fat should be put in cold since even a small quantity, if warm, will tend to make the dough soft and sticky. We grease pans, griddles, etc., because fat prevents adhesion; in the same way fat in a dough keeps the particles separate and makes it break apart readily, so that we call it "short" or "tender." Hence shortening is any form of fat that will accomplish such a result. To give like results, more shortening is required with bread flour high in gluten than with pastry flour low in gluten.

"Shortening"

Eggs in doughs, as in other cases, have the quality of making particles hold together, just the reverse of shortening. Any dough containing much egg will be elastic and spongy, and if cooked too quickly will be tough. Doughs to be made rich with butter, like pound cake, may be saved from heaviness by the use of eggs.

PASTRY AND CAKE

Shortcake and pastry are illustrations of the use of much fat in doughs and the result is brittle and tender. Success in pastry-making depends more upon keeping the ingredients cold and handling the dough deftly than any special formula or order of mixing. When but a small amount of shortening is used, a small quantity of baking powder is helpful; this, of course, is omitted in puff pastry, in which the weights of the

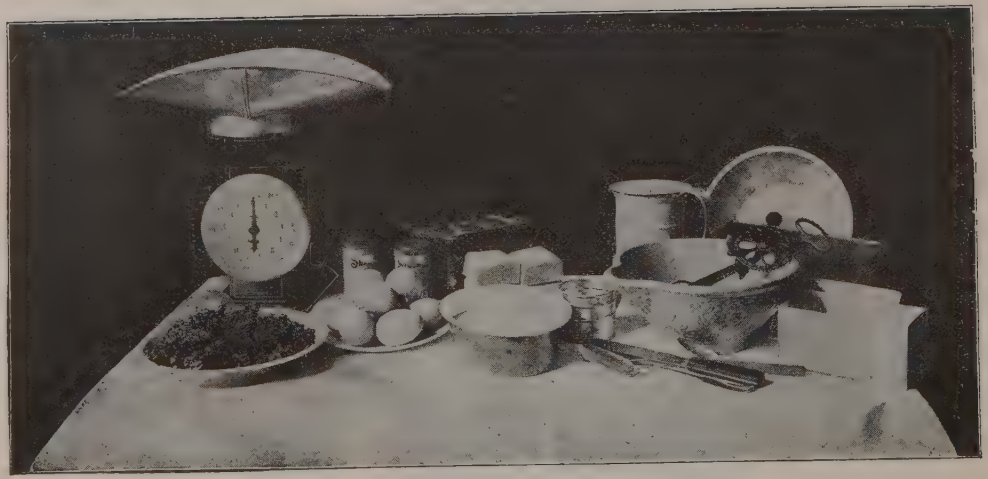
flour and butter are equal, and it is not essential in other cases.

Few doughs require a smaller number of ingredients than pastry; flour, salt, shortening, and liquid are the essentials, and air is incorporated in the process of mixing. When the flour and shortening are warm they stick together so that less air is mixed into the dough. **Pastry**

APPLE PIE IN DEEP PLATE.

The process of rolling and folding is a device for catching more air in the dough. This air, when heated, expands and puffs the layers apart. The colder the air mixed in the dough the greater its expansion in baking.

In cake-making a single, well proportioned formula may be made the basis for a great number of varieties. Therefore, it is essential that the fundamental principles be understood, then the variations can be accomplished easily. **Cake Making**



MATERIAL AND UTENSILS FOR MAKING CAKE.

Sponge Cake

The principles underlying sponge cake were explained in the section on eggs. The main points in such cakes, which contain no butter and are made light by eggs only, are to mix carefully that sufficient air may be entangled in the dough to make it light, and then to bake slowly but thoroughly.

The shape in which cake is to be baked should decide the proportion of flour to be used. Layer cakes or small cakes require less flour than large loaves. This is probably because the small cake is stiffened more quickly by the heat, while the large mass must be stiffened with flour to hold up the air cells until the heat can penetrate the whole. Variations in cake are easily obtained through changes in flavoring ingredients. To mix chocolate in the cake melt it and mix with the sugar and butter. Such a cake might have a white frosting flavored with vanilla.

Flavoring

A cake flavored with almond may have a few shredded almonds sprinkled over the top just before the cake is put in the oven. Almond paste can be rubbed into the butter and sugar in making cookies; it is rather rich and heavy for a cake. Desiccated cocoanut, chopped nuts, raisins, currants, dates, citron, candied orange and lemon peel, singly or in various combinations, serve to give us many cakes from a single recipe.

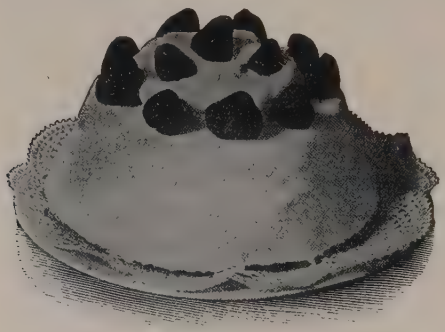
Ingredients

The ingredients mentioned for pastry are common to all cakes as well, but further variety is gained by the addition of sweetening and seasoning. Air or gas to make the cake light is obtained by the use of

beaten eggs and of baking powders, etc., as well as by creaming butter and beating the blended ingredients. The shortening for this class of dishes may be lard, dripping, nut oil, cottolene, butter, or cream, each having its own special characteristic. When these are known, combinations and substitutions are possible to adapt a given formula to the available materials.

Sweetening

The range of sweetening is limited to sugar and molasses, but the quantity to be used in a cake should be



SPONGE CAKE STUFFED WITH CREAM.

reduced if a frosting or sweet filling is to be added later.

When we consider the long list of spices and extracts and fruits and nuts available for seasoning the cake, we can see how it is possible to make many varieties of the same cake.

Relative Proportions in Cake

There is a certain relative proportion to be followed in the use of these ingredients which, once learned,

enable us to decide whether a recipe is reliable. In butter cakes there is usually less butter than sugar, and less sugar than flour. When baking powder is used less is required than would be necessary for a dough where there are no eggs. Thus two even teaspoonfuls of baking powder is enough for three cups of flour for a cake in which three or four eggs are use. Some cooks use from one to two teaspoons of baking powder for each cup of flour in all cases, forgetting that the eggs alone would make a cake quite light. When there is an excess of baking powder, the cake is liable to be coarse grained and will dry quickly.

Cottage Pudding

Dutch apple cake and cottage pudding are similar to the common muffin mixture in the proportions of flour, liquid, etc., but are made richer by increasing the quantity of fat and sugar.

Doughnuts

The ordinary doughnut mixture is not unlike a cottage pudding dough, with the addition of flour to make it stiff enough to roll easily. Or it is similar to the quick biscuit dough with the addition of sugar, egg, and spice. Because doughnuts are cooked in fat, less shortening is required than for most stiff doughs.

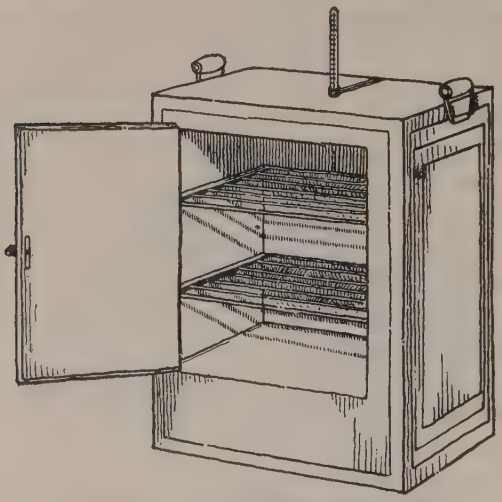
Cookies

Cooky doughs are more like pastry with the addition of sugar, spice, and egg, and the same care should be given to keeping the dough cold in order to roll and cut it without adhering to the board.

COOKING OF DOUGHS

Doughs are steamed, baked in the oven, or on a griddle on top of the stove. Such mixtures of many differ-

ent ingredients are more difficult to cook than the separate substances of which they are composed, though heat affects each ingredient in combination much as it does singly. Sugar carmelizes and this aids in producing a golden brown color in the crust of anything



AN ACCURATE OVEN THERMOMETER.
Punch a hole in a common gas stove oven and insert thermometer, which will register to 600 degrees F, wrapped with asbestos and wire where it passes through the top.

containing it. Since it burns readily, cakes and cookies are more liable to be scorched than unsweetened doughs. Flour browns when exposed to dry heat.

Eggs cook at a low temperature. Butter melts, hence doughs containing much must contain more flour than those that have little or none.

Heat Required

The heat applied should conform to the way in which it affects the principal ingredients in any dough. Those containing many eggs need moderate heat, etc., etc. The size and shape of the article are also to be considered. In general, small thin portions require less time but will bear higher temperature than larger portions as with bread doughs.

Temperature of the Oven

There are various tests for the heat of the oven. Oven thermometers are valuable aids, showing comparative if not actual degree of heat. When a thermometer is inaccessible, a piece of white paper or a teaspoonful of flour if charred from a five minutes' stay in the oven indicate too great heat and other degrees may be gauged accordingly. All parts of an oven are not equally hot and each housekeeper must study her own.

When testing with paper try different samples. One piece may be as brown at 350° F. as another at 400° F. Find one that responds readily and keep a block on hand. Then tests will be more uniform.

The lower part of a gas oven is very hot because the full force of heat is below; in the wood or coal range one side is usually hotter than the other because of the position of the firebox.

FORM AND FLAVORS

Thus far we have studied the fundamental principles of cooking and have seen that some knowledge of the chemical composition of each food is necessary before we can secure the best result through the application of heat and moisture. But this is only the foundation of the art of cookery.

Variety

The form in which our food is served may attract or repel, and the flavor may make it appetizing or the reverse. We must depend mainly for sustenance upon a few kinds of meat, vegetables, grains, and fruits, and unless variety were secured in some way we should quickly tire of them.

Through the ingenuity of cooks of all times and countries, so many combinations have been devised, by changes in flavor and form, that some of our common foods might appear in different guise every day in the year.

The multiplicity of formulas in our cook-books, even when well classified, are puzzling to the beginner who has not learned to analyze each recipe and thus find the simple processes of which it consists.

"Fancy" Cookery

What is generally termed "fancy" or "high-class" cookery is merely the application of the simple processes to costly foods or a further complicated preparation to foods which have first been cooked as perfectly as possible, according to the principles already outlined.

Creamed Dishes

For example, if we have learned how to make a white sauce and how to cook meats and vegetables, we do not require separate detailed recipes for creamed chicken, creamed oysters, creamed potatoes, creamed cauliflower, or creamed asparagus; we only need to make the sauce a little thinner or thicker to offset the

CREAMED FISH IN RAMEKINS.

dry or watery nature of the article with which it is to be put and to vary the flavor slightly to adapt it to another material.

Variety in Serving

Furthermore, any such creamed meat or vegetable may be served plain, or on toast, or in timbale cases, or combined with buttered crumbs, as a "scallop," or by the addition of stiff egg whites it becomes a "soufflé" when baked. When the sauce is made of double thickness, and combined with the meat or vegetable and chilled, the mass may be shaped into croquettes or cut-

lets which are then coated with egg and crumbs and fried.

Thus any intelligent woman knowing something of the nature of foods and the effect of heat and moisture may to some extent make her own recipes or adapt others to the supplies available at the moment.

Adaptation

No cook-book can be sufficiently expanded to provide for great variation in climate, food materials, and utensils. The cook must constantly adapt to her conditions, she must be observant of the changes of temperature and learn when one food material or flavor may be substituted for another.

Principle of Contrast

If uncertain about the wisest combination of articles of food, whether in a single dish or for the different courses in a menu, it is safe to follow the plan of contrast. Thus the cream soup is served with crisp crackers or croutons, the creamed fish is covered with buttered crumbs and baked till crisp, the croquettes are crisp outside and creamy within.

Another point is to add to any food, substances supplying any of the food principles it lacks. Potatoes are mashed with cream or butter because they lack fat, are blended with egg for croquettes or soufflé because they lack protein. Eggs lack starch, so we serve them on toast or use them in puddings with rice, tapioca, etc.

Made Dishes

Composite preparations of food, often classed as entrees or made dishes, are known by many names derived from different languages, especially from the French.

Here is no place to attempt to define all the terms used on a menu card, but we may group some of these compound dishes under a few general heads and study their characteristics. **Names**

Soups have as their basis either animal or vegetable stock or both combined. Stock is secured by the aid of heat and moisture from portions of meat and vegetables too tough to be used in other ways. Flavor and some nutriment are soaked, cooked and strained out, and this water is the stock which is then further flavored and garnished by the addition of some contrasting substance. Thus a meat stock is usually garnished with grains or shreds of vegetable, and a vegetable stock is often combined with milk and thickened. **Soups**

Stews are thick soups containing larger portions of the meat and vegetables. These are also known as chowders, ragouts, salmis, etc., etc. Sometimes a stew has dumplings steamed over it, sometimes it is covered with a crust of pastry, mashed potatoes, or cooked cereal and baked as a pie. Here again are combined contrasting food principles. **Stews**

Hash is a term that also may include the assortment of foods known as scallops, timbales, etc., since the substance giving a specific name to each of these is minced or chopped fine before it is combined with other materials. Meat and fish are put on toast or mixed with potatoes or bread crumbs or encased in rice or in a pastry shell. The exact proportions of the con- **Hash**

trasting ingredients is of less importance than their proper moistening and flavoring.

The *scallop* owes its name to the shell in which it is often served. *Au gratin* is another name for the same combination of a meat or vegetable with sauce and crumbs. The *croquette* gets its name from its crisp crust, the *timbale* from its thimble-like shape. *Rissoles* and *kromeskies* are kinds of fried meat pies or croquettes in a pastry crust.

Souffles

Soufflés have as a foundation fruit or vegetable pulp or minced meat in a sauce and are puffed up by the introduction of stiffly beaten egg whites. The name is sometimes given to cold dishes where a similar effect is gained by whipped cream.

Salads

Salads may consist of cold cooked meats, fish, etc., vegetables cooked or raw, fruits and nuts. Almost any food may be served in a salad, singly or in combination. The distinctive feature of a salad is the dressing of fat, oil, butter, or thick cream, which is variously flavored.

Left O-ers

Many of the most satisfactory of these made dishes doubtless had their origin in an effort to use left-overs.

Milk surplus may be used in many ways. Skimmed milk answers as well as full milk for soups and doughs when fat is also used. Even if otherwise likely to curdle in heating, the addition of a little cooking soda makes it possible to scald milk, and then it may be used for custards, puddings, etc. Sour milk is available for

doughs and cheese, and cream may be substituted for butter and milk in simpler cakes and cookies.

Eggs left at the table in a soft-boiled condition may be cooked again until hard and then combined with sauces and served on toast or used as a garnish in soups or salads.

Meat left-overs should be carefully sorted.

Meat Left Overs

The obloquy heaped upon hashes is due to carelessness. All uneatable portions,—bone, skin, and gristle, should be removed, but may yield a little stock if put in cold water. The clear lean may have about one-fourth as much fat with it if it is to be used in the combination with potatoes, bread or cereal. There may be two grades of the lean, one cut in pieces of uniform shape an inch or more across, to be served in a sauce or moulded in a jelly; the other to be chopped fine for hashes, croquettes, etc.

Vegetables. Cooked vegetables spoil quickly but often may serve as soup, or a scallop, or a salad for a second meal.

Fruit Combinations

Fruits. It seems practically impossible to put together several kinds of fruit without good results. Combinations of left-over fruits, raw or cooked, will serve as the basis of a gelatine dessert made like the jelly described elsewhere, or may be frozen alone, or combined with cream, or thickened for a pudding sauce, or diluted with water for a fruit punch. Add sugar as desired.

Bread. No scrap of bread of any kind need be lost. Brown bread and muffins of different kinds are sometimes wasted when they might be steamed, or toasted and served in cream sauce, or made into puddings like a baked Indian pudding. Slices of stale raised bread, dried, gives us croutons, cut in cubes, or crumbs white and brown, coarse and fine, to use for scalloped dishes, stuffing for fish and poultry, and for many kinds of sweet puddings.

Attractive Form

The use of gelatine is an instance of our endeavor to make foods attractive in form. It has doubtful food value and no agreeable flavor, but it gives solidity to fruit juices, or in aspic jelly to soup stock, and in such jellies we may mould fruits for dessert, or meat and vegetables for salad.

Garnish

Garnish is often desirable to make foods more appetizing, but it is a question whether this purpose is served by the addition of unedible materials which must be laid one side before the food itself is accessible.

The truest art does not waste effort on useless things.

Shapes

The form of foods is further varied by utensils producing different shapes, the meat choppers with adjustable knives for particles of different sizes, the fancy knives for making thin slices or balls of vegetables and fruits, the muffin pans, waffle iron, the timbale iron, the many cutters and moulds for puddings, etc. The tendency of the present day is plainly towards small portions for individual service, and here again a

new recipe is not required, only the necessary changes in time of cooking which would result when a mass was divided into several portions. Moulds in which a food is to be cooked should be greased, but rinsed with cold water when the food is only to be cooled in them.

Scales and measures are lacking in many kitchens and accurate work is impossible without them. The

Weighing

SALMON LOAF.

average kitchen need not be furnished with many special utensils, but there should be a full supply of "general purpose" articles of the best grade of material and finish.

The utensils should be adapted to the size of the family and to the physical ability of those who are to use them. The saving of human life and energy is more to be considered than the durability of implements.

Utensils

FLAVOR

The art of cooking shows us many ways of developing the appetizing flavor of foods.

Preparation

First, by the removal of whatever might produce bad flavors, such portions as skin and tainted bits of meat, decayed parts of vegetables, and over brown portions of bread and cake.

Right Heat

Second, by the right application of heat and moisture to bring out the natural flavors in each food. The steeping of tea instead of boiling, the browning of the coffee berry and cocoa bean before they are ground, the flavor developed by long cooking in cases like the baking of beans and steaming of puddings and brown bread. Sometimes a portion of the nutritive value is sacrificed to flavor, as in the browning of the outer surface of the steak or roast.

Third, by the use of many additional flavoring materials to intensify natural flavors to supply deficiencies and to produce variety.

Common Salt

Salt is useful as a preservative, seems to supply a need in the human system and therefore is an agreeable addition, but it also serves to bring out natural flavors. As an illustration of this power, taste of a meat or chicken broth that is unsalted, and again after salting, when the flavor of the meat will be much more apparent. For this purpose salt is often eaten with fruits, is added in minute quantities to lemon and other jellies made with gelatine, to custards, ice creams, and often even to coffee.

Lemon juice is also an aid in extending other flavor and is acceptable with many foods, especially fish.

Common Flavoring Material

Salt, pepper, lemon, and onion are the extent of the flavors used in some households, and food need not be insipid if no others are tried, but it is wiser to make occasional use of the long list of condiments and spices.

Condiments and Spices

The distinction as usually made is that the condiments pepper, mustard, etc., are used with meats, while spices, cloves, ginger, cinnamon, nutmeg, etc., are associated with fruits and sweets, but this classification has exceptions. Spices are neglected nowadays and it often seems as if people hardly were acquainted with any other flavor for dessert dishes than vanilla. The list of flavoring herbs is a long one, running through sage, thyme, majoram, summer savory, bay leaves, tarragon and parsley, which are used dry or fresh, to the green mint, cress, and salad plants which are condimental rather than nutritive.

There are many compound flavors which every housekeeper should keep in her store closet, and use in her cooking instead of supplying a single perennial catsup on the table, such are curry, tabasco, tarragon vinegar, mushroom catsup, poultry seasoning, etc.

Onion, celery, cheese, chocolate, coffee, meat extracts, each may have an important place in our list of flavors.

Sugar as Flavoring

Sugar is an important food and also must be looked upon as a flavor, since it will often bring an insipid vegetable up to its normal condition.

Blended Flavors

French cooking excels in that blending of flavors which produces an agreeable effect, though no one is apparent.

Adding Flavoring

The best results are usually reached when the flavoring is combined with the food in the process of cooking, but there are right and wrong ways of doing this. If salt is put on the cut surface of a roast, juice will be drawn out, but if sprinkled over the fat will gradually flavor all. Whole herbs and spices, tied in a bit of cheese cloth may be left to cook in a soup stock or brown gravy until the desired flavor is attained and then withdrawn, leaving the stock clear. Ground spices would give a cloudy effect.

Reasons for the Use of Flavoring

The use of flavors is economic, for thus inexpensive foods are varied and made palatable. It is a part of the art of cooking, since nowhere are greater skill and intelligence required than in the distribution of these elusive yet powerful substances, and by discrimination in the use of condiments and spices our foods may be made more healthful.

FOOD FOR THE DAY

In the preceding pages the most important foods, their composition and preparation for the table have been considered. Our study would be incomplete without some reference to their best combination for the daily meals that they may appeal to the palate and promote health without exceeding the bounds of moderate incomes.

Buying
Cooking
Serving

There are three important divisions in the preparation of food for a family, wise buying, good cooking, and careful serving. When buying foods the housekeeper should know the sum available for feeding each person for the day or week, she must note the season of each food, and also adapt her choice to the climate and weather. She must remember the individual needs of each member of the household, depending upon age, health, and occupation.

Art of
Cookery

The art of cookery finds its field between the choice of food and the serving of the cooked dishes at the table. As with other arts perfection can come only through constant practice in manipulation, and from continual adaptation of conditions to the desired end. No formulas for combinations of foods can be devised so complete that continuous care is not required in every step of the process.

Cost of Food

Few housekeepers have the time or take the trouble to keep their accounts in such a way as to know how much it costs to feed each person in their charge for a day, week, or month; fewer still know anything of the relative proportion of protein, fat, and carbohydrate which is placed on the family table week by week.

When purchasing clothing we take note of its wearing qualities and the ability to keep us warm, but we seldom apply the same reasoning to our foods, although it is quite as necessary.

Some one has estimated that in the average household one-tenth of the sum spent for food will go for flour, a tenth for butter, another for sugar, another for milk, one-fifth for meat, one-fifth for fruit and vegetables, and the remaining fifth for sundries.

"Constants"

There are certain articles of which equal quantities will be used each week or month, and by an examination of previous bills it is easy to estimate the amount required for a given period. Many of these "constants" like butter, sugar, and flour, can be bought in quantities sufficient for a month, then the housekeeper knows how to apportion her money for the variable supplies.

It is not necessary for the housekeeper to attempt to estimate the proportion of food principles in every dish she serves, but once a month or a quarter, if her accounts are well kept, she can see how nearly she ap-

proaches such daily estimate as the one below for each member of her family:

A DAY'S RATION

	Ounces.
Meat and fish	12 to 16
One egg	2
Butter	1 to 2
Milk, 1 gill to 1 pt.	4 to 16
Sugar	2 to 3
Dry fruits	1
Legumes	1
Fresh vegetables and fruits	6 to 8
Potatoes	8 to 12
Flour and grains	12 to 16

Multiply this by thirty and we have a fair allowance for one person for one month. Multiply this by the number of persons in the family, or, to be more accurate, by the fractional parts of a man's rations, usually allowed for women and children, and we have an ample supply for one month for the family.

If the larger quantity of potatoes has been used the smaller amount of flour would have been ample, while if eggs were cheap and two or more consumed by each person daily there should be a corresponding reduction in the amount of meat and fish.

Refuse and Waste

Of the amount purchased there will be not far from 10 per cent refuse and waste. Refuse in the form of bones, skin, and parings, waste of what is left on individual plates and odd bits that are spoiled and are

thrown away. Much fat also is thrown away, but it should be remembered that fat is worth more than twice as much as the carbohydrates in keeping the body warm.

A Day's Alowance

Twenty-five cents a head a day is a fair allowance for an abundance and variety of wholesome, satisfying food. Life may be sustained on half that amount, while fifty cents daily cannot nourish more completely, but may provide luxuries and foods out of season.

Cost of Labor

The actual cost of table board appears, from studies made under different conditions, to be about equally divided between the raw material and the labor required for the preparation and service. It may be cheaper to pay a little more for a prepared food than to use one's own strength or pay for service to get ready a less expensive article.

The woman who has time and strength and no other way to earn should choose the cheaper grade of food. Cheapness does not always indicate meanness, it may mean an abundant supply or less human labor in preparation.

Prepared Food

There is a growing tendency toward the fuller preparation of food outside the home, but there is the more need that the housekeeper should be familiar with processes of manufacture that she may know when she is well served.

Buying

The housekeeper who never goes to grocery and market and does not study the market reports in the

papers is rarely an economical buyer. She is liable to go on in the same old routine instead of varying her menus with the little surprises that may be found by visiting the markets. There are bargains to be had in foods as well as in clothing, when the market is overstocked, or some odd lot is left over. Cuts of meat cannot be made to order and the first choice falls to the early visitor to the market.

Planning

Where one woman must take entire care of a family, she must plan carefully if she would have a well balanced household. Elaborate cooking and meals of many courses are out of the question even if they were desirable. Meals should be planned several days in advance and the buying done accordingly, though such plans will be much modified in the performance.

A reserve store of canned foods, etc., is a great aid in the emergencies that arise in all households.

System

By wise use of outside supplies and by making one's head do more work and hands and feet less, the food for a family may be provided without exhausting the energy of the housekeeper.

The actual cooking necessary for a family through a day may be done in a shorter period than is usually allotted to it if the work is planned wisely. The detail of arrangement depends upon the kind of fuel used, and whether the chief meal is served at noon or night.

Breakfast

The breakfast should be a simple meal—fruit, raw or cooked, cereal or warm muffins, (seldom both at the same meal), and eggs, bacon, creamed salt fish or some cold meat. When the meat is cold the bread is warm, while with bacon or omelet toast may be served.

Some one must be in the kitchen for some time to prepare and serve even a simple breakfast, especially if there are tardy members of the family. With the same supply of fuel required for the muffins, it is not difficult for a woman of average ability to bake a cake or pudding which will then be ready for the noon or the night meal. Or at this time the vegetables may be cleaned, fruit picked over and little details attended to which save much time later.

Dinner

Noon dinners usually are considered easier for housekeeper and cook, since the work can all be done by daylight and the hours of work if not actually less are not so extended through the day. When supplies are ordered early and delivered promptly, much energy and worry is saved. At least half the time the soup may be derived from previous supplies, and be prepared in advance.

One kind of meat or fish, potatoes or rice and a single other vegetable or salad are enough for all ordinary occasions. Fruit or a dessert prepared earlier in the day completes a meal sufficient for all needs of the human body if the articles have been chosen wisely to supplement each other.

Supper

For a noon luncheon or night supper there are many variations of the soufflés, hashes and scallops already described. One of these with bread and butter, tea or cocoa, fruit and a simple sweet will provide all that is essential.

To prepare meals for a family year in and out is not an easy task. The housekeeper must remember not only the cost and nutritive value of the foods but the whims and notions of her family. The ability of the human being to talk makes him much harder to feed than the animals who must accept the balanced ration bestowed upon them.

Planning Menus

A few points to be observed in planning menus are these: avoid routine, introduce novelties, cheap or expensive, in attractive form, but say little of nutritive value or cost. Do not allow the same meat or fish to appear too many meals in succession. Let something else intervene. When the meat course is substantial let the dessert be light and make the dessert especially nutritious when the meat course is insufficient. Let there be variety on the table through the week or month but have few dishes at each meal.

In Conclusion

The fundamental processes of cookery are not many and the essential points have been outlined in these pages. An intelligent woman can adapt the recipes in any reliable cook-book to her own conditions after she knows something of the composition of foods and the way each is affected by heat and moisture.

BIBLIOGRAPHY

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Boston Cook Book ($2.00, postage 14c). Mary J. Lincoln.
Catering for Two ($1.25, postage 12c). Alice J. James.
Century Cook Book ($2.00, postage 18c). Mary Roland.
Home Science Cook Book ($1.00, postage 10c). Anna Barrows and Mary J. Lincoln.
Kitchen Companion ($2.50, postage 22c). Maria Parloa.
Lessons in Cooking, Through Preparation of Meals ($2.00, postage 14c). Robinson and Hammel.
New Book of Cookery ($1.60, postage 18c). Farmer.
Practical Cooking and Serving ($1.50, postage 20c). Janet M. Hill.
Rorer's (Mrs.) New Cook Book ($2.00, postage 20c). Mrs. S. T. Rorer.
Hostess of To-day ($1.50, postage 14c). Linda Hull Larned.
Luncheons ($1.40, postage 14c). Mary Roland.

Note.—These books may be borrowed by *Members* by sending postage. Any one may purchase them through the School by sending price.

GOVERNMENT BULLETINS

Free, of the Department of Agriculture, Washington, D. C.

34. Meats: Composition and Cooking—Charles D. Woods.
85. Fish as Food—C. F. Langworthy, Ph.D.
121. Beans, Peas and Other Legumes as Food—M. H. Abel.
128. Eggs and Their Uses as Foods—C. F. Langworthy, Ph.D.
182. Poultry as Food—Helen W. Atwater.
183. Meat on the Farm—Andrew Boss.
203. Canned Fruits, Preserves and Jellies—Parloa.
249. Cereal Breakfast Foods—Woods and Snyder.
256. Preparation of Vegetables for the Table—Parloa.
263. Use of Milk as Food—R. S. Milner.
293. Use of Fruits as Food—C. F. Langworthy.
295. Potato and Other Root Crops as Food—Langworthy.
298. Food Value of Corn and Corn Products.
332. Nuts and Their Use as Food—M. E. Jaffa.
359. Canning Vegetables in the Home—J. F. Breazeale.
375. Care of Food in the Home—Mary Hinman Abel.
389. Bread and Bread Making—Helen W. Atwater.
391. Economical Use of Meats in the Home—Hunt.
413. Care of Milk and Its Use in the Home.
487. Cheese and Its Economical Use in the Diet.
526. Mutton and Its Value in the Diet.
535. Sugar as Food—Mary Hinman Abel.

PRINCIPLES OF COOKERY

PART III.

Read Carefully. Place your name and address on the first sheet of the test. Use a light grade of paper and write on one side of the sheet only. *Do not copy answers from the lesson paper.* Use your own words, so that the instructor may know that you understand the subject. Read the lesson paper a number of times before attempting to answer the questions.

1. Mention and describe three methods of making doughs light.
2. What are the advantages in the use of baking powder? When should baking soda and cream of tartar be used separately?
3. Describe some mixture where more than one means of making it light is used.
4. How does the bread obtainable outside your home compare with what you can produce there as to cost, including time and fuel, substance, and palatability?
5. Experiment, if you can, under your own conditions and report of the effect of too rapid and too slow baking on different types of dough.
6. Rearrange this recipe for a simple cake in proper proportions and order of mixing: ½ egg, 2 teaspoonfuls butter, 2 c. milk, 1 c. flavoring, 1 teasp. flour, 3 c. baking powder, 1 teasp. sugar

7. Give examples wherein the form and manner of serving may add to the attractiveness of food and not require too much time.
8. How does bread flour differ from pastry flour? How does this affect its use in doughs?
9. Give the general proportion of flour and liquid in (1) soft doughs, (2) a batter, (3) muffin mixtures, (4) pastry or cookies.
10. Why does shortening make doughs flaky?
11. Give the one method of making bread. What conditions will hasten the process; what will retard the process?
12. Successful pastry—how made?
13. What varieties of cake are there and what ai the general proportion of the ingredients? Give some of the reasons why a cake "falls?" What makes cake dry and coarse in texture?
14. Discuss the use and abuse of "fancy cookery."
15. What is meant by contrast in foods? Give examples.
16. What can you say of flavoring?
17. How may "left-overs" of meat—of vegetables—of bread, be used?
18. On what principle should menus be planned?
19. Give the menus for the meals served in your household during one week and suggest how they might be improved without additional labor or expense.

20. With what cook book are most familiar? What are its good points and what are its deficiencies?

21. Have you had any failures in cookery which you cannot understand and which you would like to have explained?

22. What new facts and principles have you learned from this series of lessons?

NOTE.—After completing the test, sign your full name.

PRINCIPLES OF COOKING

PART IV

SUPPLEMENT

ELECTRIC KITCHEN EQUIPMENT

"Aluminoid"-Covered Kitchen Table and Children's Table. General Electric Co. Cooking Outfit (Cost $95.00). Hoosier Kitchen Cabinet. Bohn Syphon Refrigerator. (Photograph furnished by a member of the A. S. H. E.)

SUPPLEMENT

PRINCIPLES OF COOKERY IN APPLICATION TO DAILY LIFE

By Anna Barrows

Director, Chautauqua School of Cookery; Lecturer, Teachers College, Columbia University, and Simmons College.

The conditions of life in the households represented by the pupils of this school vary greatly with locality and climate, and, taken together, would give a fine composite picture of the average American home.

While reading the hundreds of papers which have passed through my hands since the School opened, nothing has impressed me more than the variety of conditions to which any woman in this country must be ready to adjust herself at short notice. Much human energy might be set free for other purposes, and much money saved, if men and women gave closer study to some of these every-day questions.

Emerson has said truly: "We must learn the homely laws of fire and water; we must feed, wash, plant, build. These are the ends of necessity, and first in the order of nature. Poverty, frost, famine, disease, debt, are the beadles and guardsmen that hold us to common sense."

COMPARATIVE VALUE OF FUELS

Every householder and housekeeper should have more definite knowledge regarding the amount of heat available from a given bulk of each of the stand-

ard fuels. One cord of wood is approximately equal to one-half ton of coal; 1,000 cubic feet of coal-gas is equal to 50 or 60 pounds of coal, or about four and one-half gallons of oil or gasoline. The time required to keep stove and fire in good condition must be counted with the cost of the fuel.

In this connection, facts reported in some of the test papers received are interesting.

From a southern plantation, wood is reported as costing only the labor of preparation for the stove, and that only sixty cents a cord. In another locality, one sixteenth of a cord of wood is used daily at a cost of twelve cents, or about two dollars a cord. Elsewhere, a housekeeper finds wood at five dollars a cord the cheapest fuel within her reach, and estimates her daily supply to cost ten cents, or about one fiftieth of a cord. Another burns a cord of wood each week for cooking only.

An English pupil writes: "The range to which I am most accustomed is the almost universal farm-house open fireplace and Glendenning oven, used in Cumberland and Westmoreland. The oven is heated by the hot air from the fire by a passage at the back of the fireplace, with only one damper for oven. At the opposite side there is nearly always what is called here a 'set-pot' for heating water. The heat of my oven is greatest at the bottom, on account of the hot air being underneath. What is not cooked in the oven is done over the open fire."

COAL

The price of coal varies according to quality and distance from the mines, and may cost from three to twelve dollars a ton. A hodful or scuttle of coal may weigh from fifteen to thirty pounds, but after weighing the contents of an average hod, any housekeeper may estimate readily the amount used daily, or for different purposes.

One woman writes that she can do her day's work with a single hodful of coal, making a ton last nearly three months, while a maid in her kitchen usually disposes of a ton a month. Another housekeeper runs a fire day and night on half a ton a month, while in a colder region three hods daily is the usual winter allowance.

GAS

Gas is available in comparatively few sections of the country outside of the large cities, but wherever it is used, housekeepers soon learn to plan their cookery to save fuel. This usually results in economy of time, so that fewer hours are spent in the kitchen, though all the necessary work is as well done as before.

A thousand feet of gas a week is a generous allowance for kitchen use in an average family. According to one report, gas at $1.50 a thousand feet has proved cheaper than coal at $5.00 a ton.

One cannot use a gas range in the same fashion as the wood or coal stove, but must adapt herself to its

plan and the nature of the fuel. A steam cooker makes it possible to cook enough food for two days over one burner at one time. Today's dinner, a cereal for tomorrow's breakfast, some cup custards for supper, a stuffed fowl to be browned over in the oven for tomorrow's dinner, all may be cooking at once.

Then, with the ovens as commonly arranged, we may broil or roast beneath the flame which is heating the other oven to bake potatoes, bread or cake.

One pupil reports that she boils potatoes in the lower part of the double boiler while cooking cereal for the next day, and above that sets a basin of milk to heat for a pudding or sauce or soup. By such forethought the expense of gas is no greater than any other fuel, and the labor of housework is much reduced.

ALCOHOL

The removal of the tax on fuel alcohol, January, 1907, may mean much to the housekeeper as well as to the manufacturer. Every one who has used a chafing dish or alcohol lamp has wished that alcohol was as cheap as kerosene. Under the new law it may reach that point.

Since it may be made of many coarse and inferior vegetable products now unused, there need be no lack of this fuel, which is practically without odor or smoke.

Thus the housekeeper must be ready to adapt her-

self to another change in fuels and apparatus for its use.

With the alcohol lamp and the hay-box much of the discomfort and dirt now associated with kitchen processes will be banished, never to return, and the kitchen itself well may be dignified with the name of "laboratory."

KEROSENE

The small oil and gasoline stoves are not used as much as they deserve. With intelligent care and high-grade oil, a well-made oil stove is safe. Fire in any form is not a plaything.

Every household without gas or electricity should be supplied with a good three-burner lamp stove and small oven to fit it. These will cost about $3.00. If this lamp is given the same care that is given lamps for evening use, results will be satisfactory. But one must not expect a small stove to work as rapidly or accomplish as much as a larger one. Have the lamp full of oil to do good work. Do not let it burn many hours in succession, but give it a chance to cool off. Keep the wicks even and clean, and have new ones when they become discolored, or too short to reach the bottom of the lamp.

Oil stoves are liable to smoke if they stand in a draft, and therefore should be protected. Choose utensils to fit the stove and oven, and never fill them so full that there is danger of boiling over into the lamp. Since the heat is greatest in the lower part of

the oven, cook on the upper shelf as much as possible, or exchange when possible. Asbestos mats may be used on the lower shelves. With two three-burner lamp stoves, and an oven to fit one, it has been easy several times, in my own experience, to do all the cooking for a family of six or eight persons.

FIRELESS COOKERS

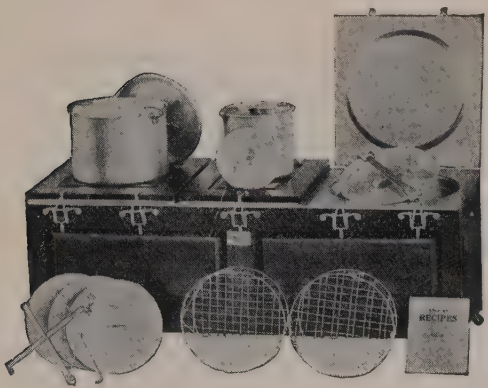
The Norwegian Cooking Box or Fireless Cook Stove is described and illustrated on pages 12-13. This device has been exploited so much of late that it deserves further description.

The new interest in this method of cooking is probably due to the experiments made in 1905, under the direction of the Commissary-General of the War Department, and these were the result of a report from United States Consular Clerk, George H. Murphy, of Frankfort, Germany. Below is a condensation of Mr. Murphy's report, as it appeared in Daily Consular Reports in April, 1905.

"In an address to an audience of working people, Mrs. Back, wife of the director of the industrial school at Frankfort, brought to the attention of her hearers, the hay-box or fireless stove.

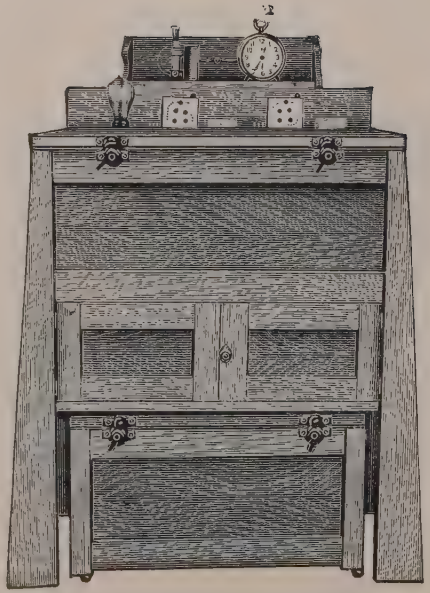
"Every housewife knows that a pot of coffee can be kept hot for some time, without fire, simply by wrapping it in a dry towel to hinder escape of heat. The Norwegian "automatic kitchen" attracted attention at the Paris exposition of 1867 but failed to come into general use. Now in Berlin, Munich, and

CYLINDER TYPE FIRELESS COOKER



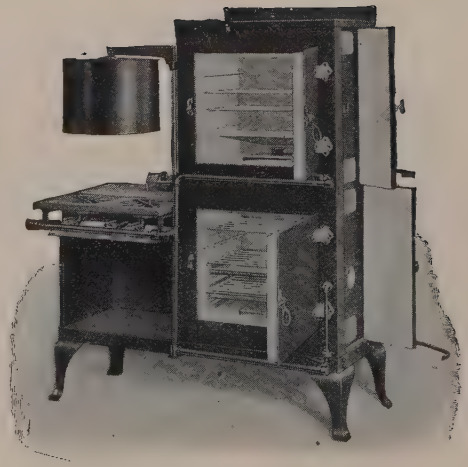
BENCH TYPE FIRELESS COOKER

The "Caloric," Aluminoid Lined with Aluminum Utensils. The aluminum utensils with clamped covers can be purchased separately for home-made cookers.



ELECTRIC FIRELESS STOVE.

Units Heated by Electricity, Automatic Cut-off.



CHAMBERS FIRELESS COOKER GAS RANGE.

Insulated Ovens and Hood.

other cities popular lecturers are showing the practical value of this method of cooking.

"Mrs Back stated that she had used the hay-box for thirteen years, thus greatly reducing the cares of housekeeping. At first she used the box merely to keep finished food warm. Discovering that the process of cooking continued, she experimented and found that she could finish, in the box, all boiled and roasted meats, sauces, fish, soup, vegetables, fruits, puddings, etc.

"The box cannot be used for articles whose chief attraction lies in the crispness resulting from rapid cooking on a hot fire, but the rest of the meal may be ready and hot in the box. Patience will secure needed experience, and remove all doubts. In general, two or three minutes actual boiling on the fire is sufficient for vegetables, while roasted meat requires twenty to thirty minutes. Most articles should remain tightly closed in the box for two or three hours, and may be left to keep hot for ten or twelve hours.

"Dried legumes, fruit, etc., should be well soaked in cold water, allowed to boil two to five minutes and left for two hours in the box. Soft vegetables should be merely brought to a boil and then placed for an hour or two in the box. Soups are improved by being allowed to develop for two or three hours in the box.

"Covers of pots should not be lifted when they

are being transferred. The object is to retain the heat as long as possible when it has once been developed. Too much water is better than too little.

"A home-made hay-box will usually be found cheaper and more practical than those with immovable felt and upholstery. Almost any box will do, which has a tight cover. The wood should not be too thin, and there should be no knot-holes or cracks. Old trunks and valises may sometimes be used in this way.

"The box should be loosely filled with shavings, paper or hay, the last being probably most satisfactory. The hay should be renewed every two or three weeks. Nests are made for the pots and the hay packed tightly under and around them. Any kind of pots can be used, although, of course, earthen ones hold the heat best. The tighter the tops fit, the better, but if the food is to be used within six or eight hours, they need not be hermetically closed. When the pots have been placed in the box carefully, without lifting the lids, they should be covered with a pillow and the lid at once securely closed.

"When not in use, the box should always be left open and the hay loosened, the pillow being hung in the air to dry thoroughly.

"The chief advantages of the hay-box may be summarized as follows:

"The cost of fuel can be reduced four-fifths or even nine-tenths.

"The pots are not made difficult to wash; they are not blackened, and they will last for an almost indefinite period of time.

"The food is better cooked, more tasty, more nutritious and more digestible.

"Kitchen odors are obviated.

"Time and labor are saved.

"There is no need of stirring, no fear of scorching or burning.

"The cares of the housewife are lessened, and her health and happiness are protected.

"The kitchen need not be in disorder half of the day.

"Warm water can always be had when there is illness in the house and during the summer when fires are not kept up.

"Where workmen's families live crowded in one or two rooms, the additional suffering caused by kitchen heat is obviated by the hay-box, for the preliminary cooking can all be done in the cool of the morning.

"At picnics the appetites of young people are only half satisfied by sandwiches and other cold food. The hay-box can furnish a hot meal anywhere at any time.

"Similarly, men and women working in the fields, or having night employment, can take with them hot coffee, soup or an entire meal, thus avoiding the necessity of returning home at a fixed hour or having it brought to them by another member of the family.

"When different employments make it necessary for the various members of a family to take their meals at different hours, this can be arranged without a multiplication of work with the assistance of the hay-box."

This consular report covered the ground so fully that any intelligent woman can make it the basis of experiments adapted to her own surroundings.

A small trunk measuring 18x22x24 inches, an agate-ware kettle with close tin cover, made to order to fit in, or merely rest on the kettle, were the appliances which served me satisfactorily this summer.

It was not easy to secure hay, so we looked about for a similar non-conducting substance, and found some boxes of excelsior and sawdust — not quite enough of either, so they were combined and put in bags and sewed up closely enough to prevent clutter. The most of the bags were of denim, but some thin cotton bags, in which five and ten pounds of sugar had come, were filled, and did good service in filling chinks.

To test the heat-retaining capacity of this outfit, two gallons of water was raised to the boiling point in the kettle. Closely covered, it was placed on one of the thicker cushions in the trunk and the others fitted in closely around and over the kettle. A blanket and some newspapers were spread over all, and the trunk locked. Twenty-four hours later the water was hot enough for dish-washing or bathing.

The statements made in the above report were fully verified by my own experience. This method of cooking is especially adapted to any article requiring long, gentle heat, such as the making of soup-stocks and broths and rendering tough meats tender. With very tough fowls, when the water cools down below 150-160° F., the whole may again be raised to the boiling point and started again in the hay-box.

It must not be expected to do everything, but every housekeeper who must depend upon a gas or kerosene stove should arrange a fireless cooker for economy of fuel and to increase her own comfort.

Many an American housewife uses both coal and gas ranges in her winter home, and in the summer cottage must depend upon wood and kerosene stoves. Probably during the year she also uses a chafing-dish occasionally, and that may derive its heat from alcohol or electricity. Wherever a house is supplied with electric lights there should be at least one electrical cooking appliance. Some excellent ones are already on the market, and the next generation, doubtless, will use this force in housekeeping as freely as we use gas.

Each of these methods of securing heat for cooking may be the best under certain conditions and have disadvantages under others. The housekeeper needs to be keen in judgment and quick to see in order to adapt her formulas of cookery successfully in turn to wood, coal, gas, kerosene, gasoline, alcohol or

electricity. She must know how to tell when a thing is "done," and not trust wholly to the number of minutes prescribed in a recipe.

Women who are called upon to make such rapid transitions become adaptable, inventive, and are less "set in their ways" in other directions. The study of processes of cookery may thus become a broadening influence and means of general education.

CO-OPERATIVE COOKING

But there are certain household traditions which hold many intelligent women in a firm grasp, and these traditions may be traced to the generations behind us, when no money value was placed upon woman's labor. It does not yet seem easy for women to count fairly the cost of foods cooked under their own roof. Until this can be done there is small chance for co-operative industries, which might relieve the pressure of home cares where house-workers are not readily secured.

Few families to-day find it wise to make butter for themselves, and many would do well to buy bread, also. When there is a demand for high-grade bread made outside the home, it will be supplied, as has been the case here with other commodities, and with bread in other countries. There are many small towns to-day to which bread is sent from first-class bakeries 100 to 200 miles away.

With stronger laws, better enforced for the cleanliness and purity of food products; with greate-

HEAT CONSERVER

Apparatus used in an attempt to deliver hot meals at a distance.

ONE WAY TO COMBINE FRUITS

intelligence on the part of the consumer, and greater skill on the part of the producer, there is no reason why we should not in the future be able to secure wholesome prepared foods of all grades at fair prices outside the home, rather than attempt to prepare everything under the home roof.

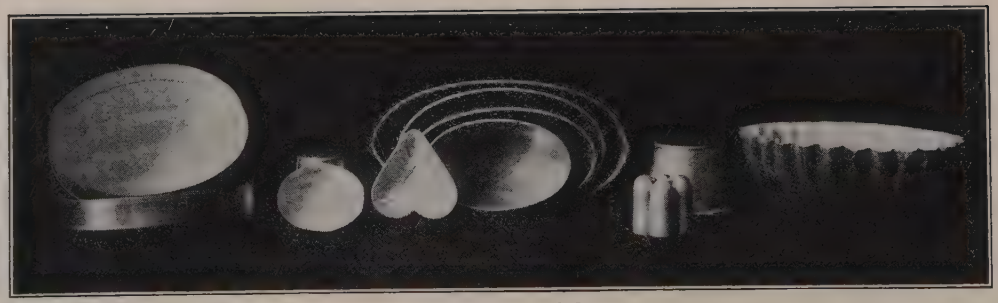
The isolated home must still be its own factory, and its director must be a Jack of all Trades. Such households should be supplied with all helps to make labor easy, but even then, much hard labor is necessary. Only where large quantities of any product are to be prepared does it pay to have all manner of machines and cunning devices to produce the most perfect results.

KITCHEN FURNISHINGS

Where many people are to be fed, a few good tools like a bread-mixer (See p. 105), meat-chopper, etc., are often more helpful than another pair of hands, unless they are especially efficient ones.

One pupil has asked for a list of necessary kitchen furnishings. A good list is given in *Household Management*, page 105. Here is another designed for beginners in housekeeping, or for small families living in city flats, where there is no room to store superfluous utensils. The stove and refrigerator are usually supplied with such apartments.

For light housekeeping, where a chafing-dish or small oil or gas stove is the only means for cooking, still fewer utensils would suffice. With the addition



FANCY MOULDS

MOULDS FROM OLD TIN CANS

Good shapes for puddings

of a few fancy molds, all the foods illustrated in this book could be prepared by the utensils here mentioned. On page 101 some of the most useful are shown.

When selecting any utensil, be sure that it is of good quality, with no imperfections that will interfere with keeping it perfectly clean.

KITCHEN FURNISHINGS.

High stool	$1.50	French knife	.50
Scales	1.00	Paring knives (two)	.30
Fibre pail	.50	Spatula	.30
Dish pan	.50	Cork screw	.25
Soap shaker	.10	Can opener	.50
Dish mop	.10	Measure cups, glass and tin	.20
Vegetable brush	.10	Wire egg beater	.10
Tea kettle	1.00	Dover egg beater	.10
Pastry board	.40	Fine strainer	.05
Rolling pin	.10	Coarse strainer	.10
Chopping bowl and knife	.50	Colander	.20
Bean pot	.30	Flour sieve	.20
Lemon squeezer(glass)	.10	Wire potato masher	.10
Tea pot	.25	Grater	.10
Coffee pot	.50	Wooden spoons (two)	.20
Muffin pan,agate ware	.50	Tablespoons (six)	.20
Quart measure	.35	Teaspoons (six)	.10
Pitcher	.50	Long fork	.10
Stew kettle and cover.	1.00	Cutters (two)	.20
Roasting pan	.50	Omelet pan	.25
Sauce pans (three)	.75	Loaf pans (three)	.60
Bowls (two)	.50	Cake pans (three)	.30
Double boiler	.75	Cake pans (three)	.30
Two quart pans (two)	.50	Scotch bowl	.50
Deep plates, to fit pan as covers (two)	.50	Glass jars (one dozen).	1.00
Cups for moulds (six)	.75	Total	$20.00

THE HOUSEKEEPER'S LIBRARY

Quite as important as helpful utensils to the housekeeper are the right kind of books.

When we remember that cooking schools have been established for a generation in all our large cities, and that the lessons given in such schools have in several places been put in book form, and when we see the lists of cook-books sent out by publishers, we might suppose that every housekeeper in America would be the possessor of several reliable cook-books. But even the intelligent women taking this course are rarely well supplied.

One pupil honestly states the matter thus:

"My failures have been many, owing partly to my lack of a cook-book. I have overcooked custards, and undercooked corn starch. I have stirred and beaten all the gas out of pancakes, and wondered why they did not rise, etc., etc."

Many women everywhere are content to depend upon cook-books issued by patent medicine venders, and upon newspaper clippings liable to typographical errors. Such things may afford helpful suggestions, but much food-material has been wasted by blind following of careless printers, and writers who have little knowledge of the art and science of cookery.

Enterprising business men realize that they must read their trade journals to keep abreast of the tide of competition. Many a woman spends more than a dollar a year for tissue paper patterns for clothing

who would hesitate to buy a cook-book once in five years, or to subscribe for a reliable household magazine.

There has been little cash recompense for the housekeeper, however much she studied her trade, but now we are beginning to realize that personal health and family comfort are above price; that they depend chiefly on the air we breathe, the water we drink, and the food we eat.

On page 140 of this hand-book, there is given a list of reliable books relating to food and cookery, the whole costing about $20. The average American housekeeper, especially if she does her own housework, should *own* at least half of these books. While she may not find it feasible to spend more than a dollar a year in this way, still she may be sure that ten dollars spent in the purchase of helpful books would save more than that amount, in a single year, in her bills for food materials.

Any one near a public library has the opportunity to read such books, and thus discover which are the ones she wishes to own. If the library is not already supplied in this direction, send in requests that certain books be purchased. (Any of the books will be loaned to members by the School).

The study of this hand-book lays the foundations in the fewest words possible for the fundamental processes of cookery. As one pupil has expressed it: "I have found the lessons wonderfully helpful in

SWEET POTATO CONE

classifying and fixing facts in my mind, and I feel that I am much better grounded in the principles of cookery than I ever should have been by merely studying cook-books."

After such a beginning, each one reading a cook-book will instinctively select and add to the foundation principles, already acquired, such explanatory details as are best adapted to her home conditions.

CARD CATALOG OF FOODS

The up-to-date housekeeper is ready to accept modern ideas and adapt methods from other departments of life to her business of housekeeping. She finds a card catalogue one of the simplest means for keeping addresses, and has another for an inventory of her household possessions, and a third for a list of foods especially suited to her family. In this list each card records not only the name of a food, but the approximate beginning and end of its season, its average price, the quantity required to serve a given number of persons, and several of the best methods of using it. Here, also, may be references to certain pages of the cook-books in her library. Or the cards may have copies of the recipes; such cards should have a hole in the top, so that they may be hung up in the kitchen within view of the worker.

When uncertain what to chose for the next day's dinner, or for some special occasion, she looks over these cards, and several possibilities will be suggested. From this plan one naturally comes to the study of dietaries and an application of the principles laid down in *Food and Dietetics*.

POTATO PEARS

Other mashed vegetables may be served in like manner

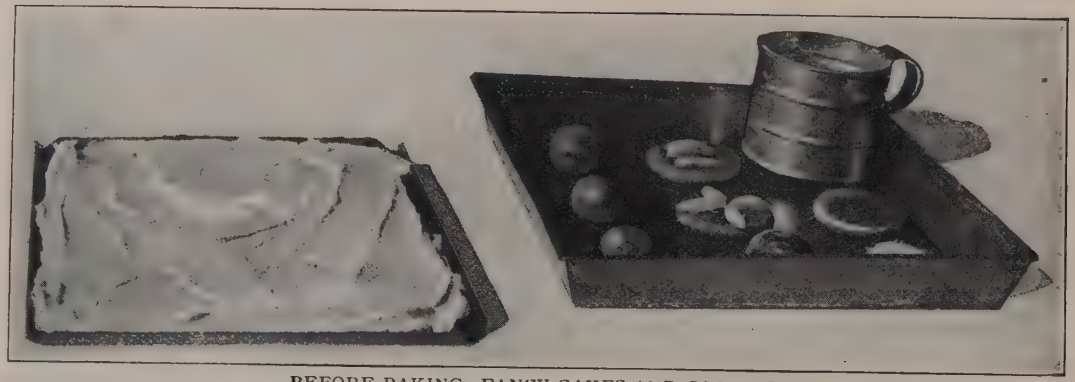
Among the helps in study along these lines are the series of dietary studies which have been issued from time to time by the office of Experiment Stations, United States Department of Agriculture, Washington, D. C. Two of the best to begin with are Bulletin 28 (Revised), "The Chemical Composition of American Food Materials" (5 cents), and Bulletin 129, "Dietary Studies in Boston, Springfield, Philadelphia, Chicago" (10 cents). The latter gives menus for several days at different prices, with itemized list of materials used and cost of each.

These may be obtained by sending coin to the Superintendent of Documents, Washington, D. C.

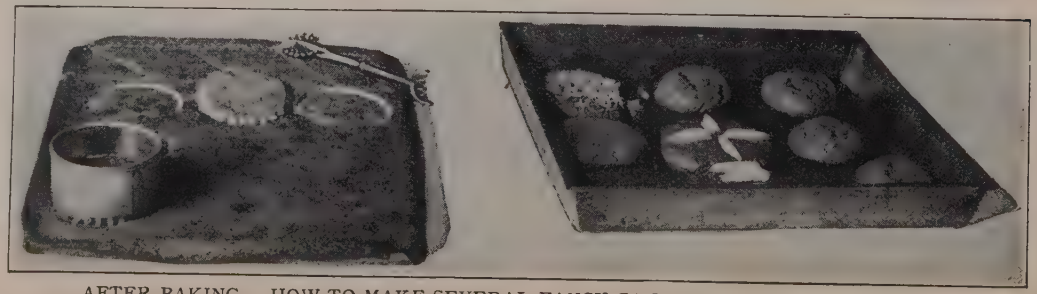
COOKERY A FINE ART

In cookery, quite as much depends upon the order and manner of combining the materials as upon the ingredients themselves. The manipulation of the cook-stove has something in common with that of a musical instrument. It is possible to play by ear with little knowledge of scales and chords, or to cook without knowing the laws of heat or the chemical composition of food materials.

Or, by continual practice, a single composition may be committed to memory and be reproduced in a mechanical fashion either upon the piano or on the kitchen range. Only after much study and repetition of processes does one become able to interpret intelligently the works of great masters, and the fundamental laws of harmony must be known, before one



BEFORE BAKING. FANCY CAKES AND COOKIES



AFTER BAKING. HOW TO MAKE SEVERAL FANCY CAKES FROM THE SAME RECIPE

can produce new creations either in music or more material things.

As music appeals to the sense of hearing, so does cookery to that of taste. The truest art in cookery is not the ability to construct wondrous complications of food materials, or to carve roses from beets, or model faces in butter, but rather to develop the full flavor of a food by the simplest process, to make the "mouth water"— that is, to stimulate the flow of the digestive juices by savory odors and flavors.

Brillat Savarin well said that the invention of a new dish meant more happiness to the human race than the discovery of a constellation, but quite as important is the constant preparation of the simple, old foods in the very best way — the baked potato, the boiled egg, the broiled steak, etc., etc.

CAKE MAKING

The mixing of cake often has more to do with its texture than the proportion of materials used, though both have their influence.

It is an interesting experiment to make a good cooky dough and bake portions of it with different proportions of flour. Take, for example, the familiar 1-2-3-4 cake formulas and transpose the flour and eggs so that we use one cup of butter, two cups of sugar, three eggs and four cups of flour. The stiffness of this dough will vary with size of the eggs and the quality of the flour. Often some liquid and more flour are added, making a less rich mixture, and then

some baking-powder or its equivalent will be needed, otherwise the creaming of the butter and the eggs will bring sufficient air into the dough.

Even before all the flour is worked in, some of the dough may be spread on a tin and cut in shapes after baking. When slightly stiffer, bits of the mixture may be dropped on the tin, fruit or nuts put over them, and they will spread out in dainty little cakes.

If still more flour is added, but before the dough is quite firm enough to use a rolling-pin, small balls of the dough may be shaped round with the hands and flattened on the pan with the under surface of a smooth tin cup.

A dough in this stage may be chilled, and then can be rolled easily, and the resulting cakes will be much richer than if more flour had been worked in.

Deft, experienced hands produce satisfactory results with doughs, because they can shape them without working in an excessive amount of flour.

MENU MAKING

Through the test questions, the attention of our pupils has been called to the planning of meals for a household, for this is an important part of the housekeeper's duties. Under Part I we asked for menus introducing as many dishes as feasible containing milk and cheese. Such menus would be useful where the meat markets were poor and milk abundant, since one may thus secure similar nutritive elements, and usually at less expense than for meats.

After Part II, the request was made for a menu for two days when eggs were cheap, and for two days more when they were expensive. This was done because few housekeepers pay sufficient attention to market prices. They get the idea that a certain food is costly, and therefore not to be used at all, when, perhaps, a careful comparison of the prices of all ingredients would show it to be cheap at some seasons. Angel and sponge-cakes, for example, when eggs are at their lowest price, are less expensive than average butter-cakes.

With eggs at 25 cents a dozen and butter at 25 cents a pound, a sponge-cake with five eggs costs no more than a cake with two eggs and half a cup of butter. If the whites of twice as many eggs are used, the actual cost is no greater, since the yolks are available for other purposes.

At the close of the lessons we asked for a week's menu from each householder represented, with suggestions for their improvement, without increase of labor or expense.

The responses show an increased attention to the details that count in feeding a family satisfactorily to all concerned.

Yet menu-making is still a great bugbear to many pupils, and a few more hints on the subject may be helpful.

Many are hampered seriously by the habits and wishes of different members of their households.

One young woman writes: "My father demands griddle cakes every morning the year round."

Naturally, with such tastes, it is difficult to introduce many new dishes, or to secure a very varied menu.

In the old days of the brick oven, most of the necessary cooking for a family was done on one day of the week, for the proper heating of that oven could not be accomplished hurriedly.

Now with the gas stove, conditions are very different, and two or three hours each day should be ample time for the actual cookery for an average family. But to accomplish everything in these limits wise planning is required. Whatever requires long cooking for breakfast must be started the previous day, and preparation for the dinner or luncheon is begun while breakfast is being made ready, and so on.

Many business women keep house in this way, and their families are as well fed as those where more time is frittered away on petty nothings. It is only by application of business methods in our kitchens, that the routine in many households can be simplified and untangled.

The preparation of food for an average household is not a difficult matter when the manager has learned her trade and each individual member is not unreasonable in his or her requirements.

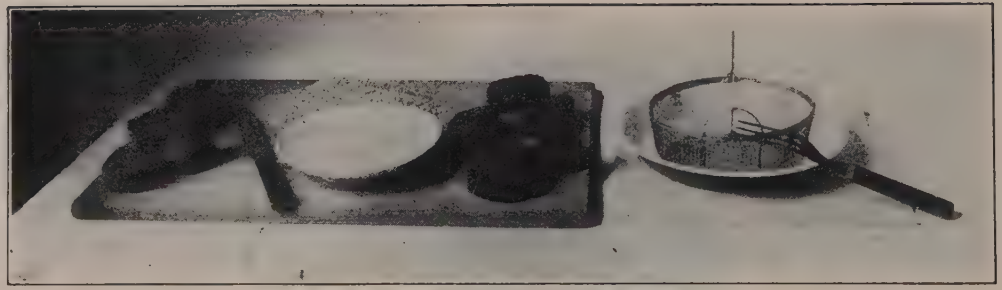
The housekeeper must think out her plan of action

for days in advance and thus save unnecessary duplication of processes.

When one pair of hands must do all the cooking, it is a foolish waste of time and strength to cook fresh food for the purpose of making composite dishes. Let those come occasionally as an easy way of finishing up some bits too good to throw away, which have already appeared in other forms. For example, it

Making Timbale Cases.

takes no more effort or fuel to boil twelve potatoes than is required to cook six. These may appear one day as plain boiled, if we have a roast with a good gravy. The next day we are to serve the meat cold or perhaps fried fish with no sauce, so the second portion of potatoes is cut in cubes or slices and reheated in butter, flavored with onion, and sprinkled with chopped parsley just before serving, giving us Lyonnaise potatoes. Or we might prefer Delmonico potatoes and put them in layers in a pudding dish with



READY FOR MAKING CROQUETTES

SOME WAYS TO USE STALE BREAD

a sprinkle of cheese between, pour a thin white sauce over, cover with buttered crumbs, and heat through in the oven. Or the potatoes may be mashed and for a second appearance take the form of a huge cone, or apples, or pears for individual service.

Sometimes in our zeal to use up left-overs, we expend much time and strength and more additional material than the value of the original article warrants. But if one owns a timbale iron, those fragile shells resulting from frying a batter on it are attractive receptacles for a little creamed chicken or a sweetbread.

Croquettes have their place occasionally, and often save the purchase of more meat and thus justify the time they require. A garnish of crisp triangles of toast around a dish of creamed meat disposes of both the scraps of meat and bits of bread — or cases may be made of bread and browned in the oven and filled with meat.

The store closet should be kept well stocked, and this is less expensive and far easier than buying things as needed. One order a week ought to be enough for the staple groceries, and two orders a week in winter and three in summer for meats, fruits, and fresh vegetables. Do not order by telephone, but at least once each week visit the market and make the order according to what is available there.

The time often spent in a daily visit to markets or

BOSTON BAKED BEANS

a daily call from the store-man can be used to better advantage in an average home.

A fair supply of good-grade canned goods should be kept in the house for emergencies; but as a whole these are more expensive than fresh cooked meats and vegetables; but where fuel is expensive and labor high, they may be used more freely.

Milk should be used generously. Many families would do well to double their present milk supply. Where milk is abundant and canned vegetables at hand, it takes but a few moments to prepare a nourishing and attractive cream soup of corn, beans, peas, or tomatoes. If the top of the milk has been used for cereal and coffee, the remainder will be quite as satisfactory as whole milk for soups or puddings, when butter or other fat is added.

If our home is at a distance from markets and we have an abundance of one type of food material and little of others, then it may be necessary for us to devise many ways of serving this one, and then we must use different forms and flavors that we may not tire of the monotonous diet. But when the season of any fruit, vegetable, or meat is brief, then we need serve it only in its natural form or cooked in the simplest manner.

As the seasons change, cold merging into heat and heat into cold again, we let our fires go out, then we kindle them, and we decrease and then increase our clothing. But few households make a corres-

pondingly marked change in their food, adapting it to the differing needs of the body as the external temperature changes.

All of us know places where pork and pies occupy as prominent a position on the tables in July as in January, though their heat-giving qualities make them out of place in summer, even if admissible in winter.

Some Ways of Serving Oranges.

"Pork and beans," where the fat predominates, may be suitable for midwinter, while "baked beans," with a small amount of fat — be it pork, beef, butter or olive oil — are not out of place at any season.

Another phase of this matter is the improvement in flagging appetites, which is accomplished by a change in food. The city dwellers are often better off in the spring than the country family. From the South to the city markets come greens of several kinds, asparagus, lettuce, cucumbers, and radishes, while the country garden is still bare. A small bunch of asparagus as a garnish around some inex-

Lambs Heart with Asparagus.

pensive meat like lamb or calf hearts will give relish when a larger quantity would be an extravagance.

Those who prepare the food for the family deserve a change of labor from season to season, and many women in the country would do well to strike from pie making and spend the time so saved out of doors. It is no harder to care for a strawberry bed than to

Apricot or Peach Jelly.

wield the rolling pin or bend over a hot stove, and strawberries may well be substituted for pies.

True economy must be practiced in the planning of menus and one thing fitted into another so that nothing is lost.

USE OF FATS

Perhaps there is no one thing more often wasted in the average household than fat, yet this is essential to our health, and we pay high prices for it in cream, olive oil, and butter, when cheaper forms might be substituted in some cases.

The fat trimmed from meats is too often left at the market or thrown away after cooking, instead of clarifying it according to the directions on page 73. This, when properly prepared, would be far superior to the lard and cooking butter often bought for culinary purposes.

The flank fat from beef, or "cod fat," as some market-men call it, is much softer than suet, and, if carefully prepared, is to be preferred to cooking-butter for making ordinary cookies, gingerbread, pastry, etc. This clarified fat usually costs less than ten cents a pound, even after the weight of the scraps is deducted.

When a housekeeper has not time to prepare such fat, she may buy *uncolored* oleomargarine at about half the price of table butter, or in the vicinity of fifteen cents a pound. (Colored butterine is taxed ten cents a pound.) Many preparations of cotton

FRUIT SPONGE

Interior View Open

A WINDOW COLD-AIR BOX, MADE OF GALVANIZED IRON (Price $3 50.)

seed oil are on the market, which are satisfactory when fresh for frying and for use in doughs.

One must use discretion in combining fats for different uses. It is not desirable to use smoked fat like that from bacon, or highly seasoned fat, such as comes from sausages, for frying doughs, but these should be kept each by itself and used for warming potatoes and other vegetables.

The hard suet and soft chicken oil clarified together give an excellent compound, which may be substituted for butter in tomato sauce and some soups, as well as in many doughs.

In the same way all bits of meat and bone should be used for stock, alone, or combined with vegetables. Where meat is served once or twice daily in a house, there is rarely need of buying any especially for soups.

TABLE SERVICE

The desirability of careful table service for the simplest foods is shown by this incident told by one pupil.

"My aunt had great difficulty in getting us to eat cereal for breakfast, so she bought us each a very pretty blue bowl. We were allowed to use these only when we had cereal for breakfast. The result was that we eagerly asked for it every morning and now are very fond of the various kinds."

No one can deny that such attention to details is an important part of the housekeeper's duty.

Where there are no servants, a housekeeper must

be careful that her efforts for dainty service do not involve her in labor beyond her strength. Each member of the family should have a part in the table service that everything may move smoothly.

MENUS FOR SPECIAL OCCASIONS

Every housekeeper occasionally has to plan a special menu for home or club or church society, and consideration of this matter may be helpful here.

It is of first importance that we do not undertake more than we can carry out well. This applies to the choice of the food material, to the number of courses, and the way in which they are to be served.

Instead of sending away for rare luxuries with which our guests might be familiar every day, let us make the most of the specialties of our own locality.

The table decorations may take the form or color of the season, but beware of special shapes or garnishes which might cause any deterioration of the food to be served.

Other essential points are to have everything served at the proper temperature, to alternate brown and white or crisp and soft effects, and to avoid having the same article appear in two different courses.

This couplet from an old English poet sums up the whole matter:

"Three dishes well dressed, and a welcome withal,
Both pleaseth thy guest, and becometh thy hall."

GENERAL DIRECTIONS

FOR

WAITRESSES AT THE LAKE PLACID CLUB

By Mrs. Melvil Dewey

Secretary, Lake Placid Conference on Home Economics.

To serve food at the right temperature, both hot and cold, with neatness and the least possible noise and delay, constitutes the true art of the waitress. It is a problem in economics requiring careful study that there may be no waste of time and energy.

To Lay the Table. Put on silence cloth, then table cloth with middle folds in the center and the center ornament of ferns or flowers. Arrange places symmetrically. Place knives with sharp edge in, and spoons, with bowl up, at right of plate, forks with tines up, at the left, all one inch from edge of table. Napkins in the center. Glass at right just above point of knife, bread and butter plate at left above forks. Place three sets of salts and peppers on each table, one set at each end and one in middle for long tables; for round tables one third distance apart. Have bread, butter, and water carafe on table at every meal. Fill carafe and butter plates the last thing. Serve cream in individual pitchers, and have a china pitcher of milk on table for breakfast and supper. Leave wafers, jelly, and relishes on table as well as bread, butter, and water.

Waiting on Table. Keep cool, move noiselessly, wear rubber heels, avoid all clatter of dishes. Study your table carefully, see that everything is in place, that sugar bowls, salt and pepper sprinklers, vinegar and oil cruets are filled, that the extra dishes needed, silver, and finger-bowls are on the side table, and that neatness prevails.

While waiting, a chair may be drawn back from table at least three feet, and waitress may sit till guests for her table enter dining-room. Never sit near enough to touch the table. Rise as your guests approach, seat the eldest lady or head of the party, pass the menu card to her or the one who usually orders first. Fill glasses and serve butter while menu card is examined. Put only small piece of ice in each glass, enough to cool it, unless more is requested. Some prefer water without ice; study preferences.

Stand at the left when you pass or receive dishes. Stand at the right when you set down tea, coffee, plates or other dishes. A safe rule is, pass from the left, set down from the right. Place dishes in neat orderly straight lines.

Begin with a lady or older person.

For Breakfast, bring fruit and cereal orders together. If near kitchen, a second trip may be made for the hot cereals.

Place finger-bowls when fruit and cereal is set down and take orders for next course.

Before leaving the room at any time see that each

guest is provided with all needed for the previous course, whether finger-bowl, sugar, cream or spoon for cereal or coffee, and that bread, butter, water (the constants for each meal) are sufficient.

Remove finger bowls and soiled dishes before placing next course.

For the meat course set down plates from right and pass each dish from which guest is to help himself at his left. Leave plates of rolls, muffins, and bread on table, always, not on side table.

The last thing at end of each meal, remove plates and place finger-bowls one third filled, with doily under bowl, before each guest.

Remove every soiled dish from the table as soon as the purpose which it has served is over.

Never reach across the table in front of a person.

In lifting glasses and pitchers never put fingers on the rims.

For Dinner, general directions are the same. Bring soup individually, pass wafers, and take orders for next course.

Where meat orders vary, bring an individual platter if for one only, on larger platter according to number to be served.

Bring vegetables in covered dishes and pass in order seated, beginning, when convenient, with a lady or elder person. Reverse order of passing occasionally that the same person may not always come last.

Study the tastes and individuality of each person and anticipate needs if possible.

Unless asked to do so, do not bring individual dishes for vegetables except for one person who may come specially early or late. Bring in covered dishes, only enough food for orders given; take out and replenish with hot food as other orders are taken.

Leave bread and butter plates till after salad course.

Remove everything before dessert except needed silver and glass. Brush crumbs lightly from table to clean plate with napkin or doily before dessert is placed.

Serve coffee after dessert.

Place finger bowls as at breakfast.

Study each person's order as though for yourself and see that everything needed to go with it is at hand, salt, pepper, vinegar, oil, sugar, cream, spoon, knife, fork, finger-bowl, whatever the course may require.

Avoid extra trips to kitchen or serving-room for one article. See that everything required for that course is on tray before you leave.

In removing dishes much waste can be avoided by a little care. Trays should not be piled up high so that breakage occurs from dishes sliding off. Jellies, pickles, nuts, salads, olives, butter, bread, and food served on dishes other than the one from which it is eaten, should be taken to special table in serving-room or kitchen and cared for by pantry assistant.

SUPPLEMENTAL PROGRAM ARRANGED FOR CLASS STUDY ON

PRINCIPLES OF COOKERY

Ample material for a course of six or more lessons may be secured from the lesson books on *Principles of Cookery* and from the Government Bulletins. The Farmers' Bulletins may be obtained without charge by writing to the United States Department of Agriculture, Washington, D. C. As many copies of each will be sent as desired. The bulletins for which a price is given may be obtained by sending *coin* to the Superintendent of Documents, Washington, D. C. The Government will not accept postage stamps. A few reference books are mentioned which will be loaned by the School for the cost of postage given, if not available in the local public library. Any encyclopedia will furnish much on every subject, and a book of standard quotations will also add to the interest of the meeting.

All the common daily foods may be studied from the historical or literary standpoint, for each has a history and literature of its own. Often it is wise to set the practical housekeeper to look up the historical side of a food, while a philosophical member is required to report upon its practical use. Thus each gets a fresh point of view and a new interest in an old subject.

It might prove interesting to arrange for a series of lunches to illustrate the foods being studied. Here it is best to keep out of the conventional lines and make the menus educational. When the class is large, a few may be chosen to prepare the lunch for all and directed to keep the expense within certain limits, 10 to 20 cents apiece, and to give a report. Chafing dishes should be provided for each group of four to eight and some experimental cookery tried.

MEETING I

(Study pages 1–39)

Fuels and Appliances for their Use

Work of Count Rumford:— Rumford Kitchen Leaflets, No. 1. ($1.00, postage 8c.)

Work of Benjamin Franklin. See encyclopedias.

Aladdin Oven. See Science of Nutrition, by Edward Atkins. ($2.00, postage 14c.)

Fireless Cook Stove. Pamphlet, postage 4c. See also Supplement to *Principles of Cookery*.

The Gas Stove. If gas is in common use, have members calculate the amount of gas required to bake a loaf of bread, a cake, to boil two quarts of water, etc., by observing the length of time taken to burn two cubic feet — i, e., one complete revolution of the hand of the small dial D. See page 10. See also Question 5.

Electric Cooking — Technical World Magazine, July 1906. (Postage 6c.)

Water

Experiments: See pages 21, 22. Test the water boiling slowly and boiling hard with a thermometer. Note the simmering temperature and observe how much less heat is required to keep the water at this temperature than to keep it boiling vigorously. (If a gas stove is not available, use a small kerosene stove or a chafing dish burner.) A suitable thermometer may be obtained through the school for 50 cents. Loaned for 6c postage.

The experiment on page 22 can be made with one dish using the same quantity (say a cup) in each case.

Topic: Kitchen Experiment.

References: Chemistry of Cooking, by Williams. Chapter II. Boiling of Water. ($1.50, postage 12c.)
Drinking Water and Ice Supplies, by Prudden. (75c., postage 6c.)

Preserving

Canning of Fruit, Preserves and Jellies, Maria Parloa. Farmers' Bulletin No. 203, *free.*

Improved Method of Canning, in Farmers' Bulletin No. 262.

Use and Abuse of Food Preservatives. Extract No. 221. Free, Department of Agriculture, Washington, D. C.

MEETING II

(Study pages 39–54)

Milk

Make sour milk cheese and junket. (See page 44.)

Show how acid may be used with milk without curdling. (See page 45.)

References: Farmers' Bulletin No. 42, Facts about Milk; No. 74, Milk as Food; No. 29, Souring of Milk and other Changes in Milk Products; No. 63, Care of Milk on the Farm; No. 210, The Covered Milk pail; No. 227, Clean Milk.

Milk and its Products, by Wing. ($1.00, postage 10c.)

Butter

See experiments page 50.

White Sauce: In a chafing dish, or over a small kerosene or gas burner, make white sauce by three methods described on page 51.

To what extent may other less expensive fats be substituted for butter.

Make white sauce with oleomargarine.

Have some member make two or three small cakes from the same recipe. In one use butter, in another oleomargarine, in another a mixture of equal parts of lard and beef suet. Bake all at the same time and have all conditions as nearly the same as possible. Show results.

Topic: French Sauces and their Inventors. See Hand Book of Domestic Science, by Wilson, page 69. ($1.00, postage 10c.) And other books.

References: Extract No. 44. Butter Substitutes.

Sanitary and Economic Cooking, by Mary Hinman Abel. Chapter on Fats and Oils. (40c., postage 6c.)

Cheese

Make and serve Welsh rarebit made from different recipes, using the same kind of cheese, or make two lots by the same recipe and method, using two or more grades of cheese. See Question 17.

Exhibit: Show samples of all possible kinds of cheese; prices and composition.

Topic: Ways of using Cheese in Cookery. See Sanitary and Economic Cooking and Cook Books.

References: Farmers' Bulletin No. 82, Curd Test in Cheese Making; No. 144, The Curing of Cheese; No. 162, Cheese Prints; No. 202, Manufacture of Cottage Cheese; No. 244, The Food Value of Cottage Cheese; No. 166, Cheese Making on on the Farm.

Chemistry of Cooking, by Williams; Chapter IX, Cheese. ($1.50, postage 2c.)

(Select answers to Test Questions on Part I and send them to the School for correction and report on experiments.)

MEETING III

(Study pages 55–82)

Eggs

See experiments on cooking of eggs in water, page 57.

Try similar experiments in "frying" eggs with fat at high and low temperature.

See Question 6.

Show egg mixtures as custards, sponge cakes, etc., cooked at too high a temperature and the same ingredients cooked at correct temperature.

References: Farmers' Bulletin No. 128, Eggs and their Use as Food; No. 103, Preserving Eggs; No. 122, Flavor of Eggs; No. 262, Color of Eggs.

Meat, Fish, Fowl

Sanitary and Economic Cooking, "Methods of Cooking Meat," by Mary Hinman Abel. (40c., postage 6c.)

See Cook Books.

Farmers' Bulletin No. 34, Meats: Composition and Cooking; No. 85, Fish as Food; No. 182, Poultry as Food; No. 193, Cooking Meat; No. 162, Cooking Meat.

The Roasting of Beef, by Isabel Bevier. Circular No. 71, University of Illinois (postage 2c.).

Topic: Methods of Cooking Cheap Cuts of Meat in Palatable Form.

MEETING IV

(Study pages 83–97)

Vegetables

See experiments, pages 83–84.

Get up an exhibit of uncommon vegetables.

Illustrate the effect of overcooking vegetables by boiling a peeled potato,—one until it is just soft, another until it becomes soggy.

Topic: History of the White Potato.

References: Farmers' Bulletin No 256, Preparation of Vegetables for the Table, by Maria Parloa. Farmers' Bulletin No. 121, Beans, Peas and other Legumes as Food, by Mary Hinman Abel; No. 127, Sweet Potatoes; No. 244, Cooking Qualities of Potatoes; No. 73, Losses in the Cooking of Vegetables; Extract from Year-Book, 1900, Value of Potatoes as Food.

Grains

History: See "Corn Plant" by Sargent. (75c., postage 6c.)

Experiment: Cook cereal breakfast food for twenty minutes as directed. Start another portion the night before and cook for two hours, heating before serving. Compare results.

References: Farmers' Bulletin No. 249, Cereal Breakfast Foods; Extract 324, Wheat Flour and Bread; Extract 326, Macaroni Wheat.

The Cooking of Starch in Cereals, Extract No. 7, Illinois Experiment Station. (Postage 2c)

(Select and send answers to Test Questions on Part II.)

MEETING V

(Study pages 99–122)

Bread

Demonstration: Illustrate proportion of flour and liquid for (1) Batters, (2) Muffin Mixtures, (3) Soft Dough, (4) Pastry Dough. See pages 99–100.

See experiments with Leavening Agents, page 108.

If members are in the habit of making their own bread, hold a bread contest, appointing judges to grade the bread according to the chart designed by Professor Isabel Bevier for the Illinois Domestic Science Association, viz.

Flavor	35
Lightness	15
Grain and Texture	20
Crust—	
Color, Depth, Texture	10
Crumb—	
Color, Moisture	10
Shape and Size	10
	100

Size of pan recommended, $7\frac{1}{2} \times 3\frac{1}{2} \times 2\frac{3}{4}$ inches.

Pastry and Cake: Illustrate the difference between bread and pastry flour by making two cakes exactly alike and baking at the same time.

Illustrate the effect of a quick and a slow oven on the same dough.

Topic: Use of thermometers.

Bread: Quotations from prose and poetry by members.

References: Farmers' Bulletin No. 112, Bread and the Principles of Bread Making; No. 114, Skim Milk in Bread Making.

Story of a Grain of Wheat, by W. C. Edge. ($1.00, postage 10c.)

MEETING VI

(Study pages 122–138)

Food and its Appeal to the Senses

The importance of flavor, etc., as an aid to digestion: See The Work of the Digestive Glands, by Pawlow, the "Psychic or Appetite Juices." ($2.00, postage 16c.) Also Food and Dietetics, by Hutchison. Pages 396–397. ($3.00, postage 26c.)

Cut illustration of cooked food from magazine to be discussed and criticised by members.

Topics: The Use and Abuse of Garnish in Food.
Harmony in Colors, Flavors and Odors in our Foods.
Salads.
Use of Left-overs.

Menus

See Supplement.

Menus for a week: Have each member give her method of planning meals.

Menus for Social Occasions.

Topics: Economy of Time and Strength in Cooking.
Is Hospitality a Lost Art.
Serving by different Methods. Illustrated

References: Hostess of To-day, by Linda Hull Larned. ($1.50, postage 16c.)
Home Science Cook Book, by Anna Barrows and Mary J. Lincoln. ($1.00, postage 10c.)

(Select answers to Test Questions on Part III and report on supplemental work and experiments.)

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FREEHAND COOKING

M. LeBosquet, *Editor.*

THE purpose of this Bulletin is to tabulate the material in *Principles of Cookery* and to give the comparatively few fundamental recipes in cooking which are capable of infinite variation.

Exact proportions, conditions, and materials are essential to obtain identical results in cooking, but materials vary somewhat and conditions differ, so that it is often necessary to modify a recipe. By "free hand cooking" is not meant hit or miss cooking, or cooking by guess, but the compounding of food materials on scientific principles—not following blindly by "rule of thumb" recipes which may have been made for different conditions.

WEIGHTS AND MEASURES.

3 teaspoons=1 tablespoon	2 pints=1 quart
16 tablespoons=1 cup	4 quarts=1 gallon
2 cups=1 pint	1 cup=8 ounces (volume)

A gallon of water weighs 8 1/3 pounds—a cup of water, 8 1/3 ounces (avoirdupois). A gallon contains 231 cubic inches.

All materials are measured level, i. e., by filling cup or spoon more than full and leveling with a case knife. This applies to liquids which "round up" in spoons. Flour, meal, and fine sugar are measured after sifting. Measuring cups are not always accurate and ordinary tea and tablespoons vary considerably.

Test spoons with each other and with the cup before using.

APPROXIMATE MEASURE OF ONE POUND.

2 cups milk	2 5/6 cups granulated cornmeal
2 cups butter	2 2/3 cups oatmeal
2 cups chopped meat	6 cups rolled oats
2 cups granulated sugar	4 1/3 cups rye meal
2 2/3 cups brown sugar	1⅞ cups rice
2 2/3 cups powdered sugar	2 1/3 cups dry beans
3½ cups confectioners' sugar	4 1/3 cups coffee
4 cups patent flour	8 large eggs
4 cups entire wheat flour	9 medium eggs
4½ cups Graham flour	10 small eggs

Note.—Read "tablespoons" in place of cups in the above and the weight is about 1 ounce.

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No table of weights to measure can be more than approximate, as different samples vary in weight for bulk. In truly scientific cookery quantities should be measured by weight. The table is useful for comparison, i. e., powdered sugar is more bulky than granulated and less so than confectioners', hence the greater sweetening power of granulated; ordinary white flour (sifted) is less bulky than graham flour, and so on.

Experiments have shown that there may be a difference of 25 per cent in the weight of a "cup of flour" measured by different persons in different ways. One method is to sift the flour onto a square of glazed paper (or oil cloth) and pour it into the cup placed on another piece of paper—tap the side of the cup once with a knife and level.

METHODS OF APPLYING HEAT

BROILING—Cooking before or over glowing coals or under gas. Radiant heat. High temperature at first to sear outside, thus developing flavor and retaining juices; then lower temperature for the heat to penetrate and to avoid burning.

PAN BROILING—Cooking on very hot griddle with only sufficient fat to prevent sticking.

ROASTING—Same as broiling, superseded by baking in oven.

BAKING—Cooking in oven by heated air and radiation.
Slow oven, 270°—350° F.
Moderate oven, 350°—400° F.
Quick oven, 400°—480° F.
(These temperatures were taken by a thermometer through the top of a gas stove oven).

BOILING—Cooking in boiling water, 212° F.

STEWING—Cooking in water at temperature 160° to 180° F.

STEAMING—Cooking in contact with steam, 212° F.

DRY STEAMING, as in a double boiler, 192° F.

FRYING—Cooking by immersion in deep fat, approximately 360° F. for uncooked foods, 380° F. for cooked foods. The fat used: all lard, 2/3 lard and 1/3 bef suet, "cod fat" from the flank of beef, oil, "snowdrift," "cottolene" and mixtures. Temperatures vary to produce similar effects with different fats.

SAUTE-ING—Cooking in small quantity of fat—often called frying.

BRAISING—Combination of stewing and baking. Meat is often first seared to develop flavor and prevent escape of juices.

FRICASSEEING—Combination of sautéing and stewing.

COMPOSITION OF RAW FOODS

Parts in 100 (approximate).

Wheat Flour—12 water, 12 gluten, 75 starch, 1 fat.
Cornmeal—12 water, 9 protein, 75 starch, 2 fat.
Beans and Peas, dry—13 water, 24 legumen, 60 starch, 2 fat.
Potato, white—78 water, 2 protein, 18 starch, trace of fat.
Parsnips, Carrots, Turnips—85 water, 1 proteid substance, 9—12 starch and sugar, ½ fat.
Banana—75 water, 1 protein, 22 sugar and starch, ½ fat.
Loin of Beef (avg.)—60 water, 18 protein, 20 fat.
Eggs—74 water, 13 albumen, 10 fat.
Egg, white—86 water, 12 albumen, no fat.
Egg, yolk—50 water, 16 albumen, 33 fat.
Milk—87 water, 3 casein, 5 sugar, 4 fat.
Cheese—33 water, 26 casein, 33 fat.
Nuts—3 water, 20 protein, 15 starch, 55 fat.
Butter—12 water, 1 protein, 85 fat.
Lard, Olive Oil—100 fat.

All the above foods except refined fats, sugar and starch, contain from ½ per cent to 1 per cent of *mineral matter* (salts), apparent when the foods are burned as *ash*. Butter and cheese have 2 per cent or 3 per cent of common salt added.

Protein foods are eggs, meats, fish, cheese.

Starchy foods are the grains—wheat, rice, rye, oats, corn, etc., beans, peas, potatoes, chestnut.

Fats are prominent in fat meats, nuts, cream, butter, lard, vegetable oils.

Cellulose or woody fiber is found in vegetables, unscreened flours and meals, and in fruits, especially when unripe.

EFFECT OF HEAT ON FOOD MATERIALS

STARCH absorbs water, swells and becomes partially soluble in water. This begins at about 150 degrees F. Dry starch begins to change to dextrine at about 320 degrees F.

SUGAR is not changed at low temperatures unless acid is present. It melts at about 365 degrees and begins to caramelize at about 420 degrees F. Sugar, boiled with acid, changes slowly to glucose or non-crystallizing sugar.

CELLULOSE itself is not affected by cooking, but the connecting substances are softened and it may be separated.

PROTEIN foods are hardened somewhat by heat. Albumen coagulates completely at 160 degrees F. and will no longer dissolve in water. Other proteins, as *gluten* of flour, *casein* of milk, *ligumen* of peas and beans, *myosin* of meat, are hardened somewhat.

GELATIN is formed from *gristle* and *connecting tissue* of meat, and from bones, by long continued heating in the presence of water.

FAT is not changed except at a high temperature, when it is broken apart—"split"—into fatty acid and glycerine. Some of the glycerine is changed into "acrolein" at very high temperatures, 500° and over, which is very irritating to the mucous membrane, as is recognized by the smarting sensation given to the eyes and nose when fats are overheated. Butter begins to "split" at about 256° F., lard at 360° F., beef suet at 440° F., cottolene and snow drift at 450° F., especially prepared cotton-seed oil and olive oil at 600° F.

BAKING POWDER, a mixture of cooking soda and an acid substance, as cream of tartar, or phosphates, or alum, undergoes chemical change, whereby carbon dioxide is set free and salts—as Rochelle salts, or phosphate, or alumina compounds—are formed. The heat of the oven expands the air or gas in the food, evaporates part of the water and drives out volatile substances like alcohol.

All these changes are, for the most part, physical rather than chemical in their nature. For example, in a cake after baking, the sugar is still sugar, the starch is still starch, the fat is still fat, and the albumen is still albumen. All the materials have been blended, flavors having been developed through minor but complex chemical changes and a small proportion of the starch and sugar in the crust have been changed to dextrin and caramel.

TEMPERATURE AND TIME OF COOKING

All food materials are poor conductors of heat—it takes time for the heat to penetrate.

The correct time and temperature depends on (1) what

is to be accomplished, (2) size and thicknesses, i. e., the extent of surface exposed to the heat, compared to the bulk.

Foods with a large proportion of eggs require low temperature to prevent toughening.

Starch requires nearly the temperature of boiling water for cooking.

No food containing much water can be raised to a temperature above the boiling point—212 degrees F. Water gives off vapor at all temperatures, but at 212 degrees F. steam forms rapidly and in so doing absorbs a large quantity of heat. No brown crust can be formed until the water from the surface is nearly all evaporated. A full oven in which much water vapor is being given off requires the application of more heat than when only one or two dishes are in it.

In baking doughs, the larger the mass the lower must be the temperature in order that the heat may have time to penetrate to the interior and expand the gas and harden the albumen and gluten. If the temperature is too high at first, a crust forms, preventing the proper expansion of the loaf and hindering the penetration of the heat.

Thin loaves, pieces of meat, etc., need much less time for cooking, because the heat penetrates quickly. Higher temperatures may be used, as the food is cooked before the surface begins to be burned.

Mixtures containing much sugar or molasses burn easily.

Vegetables containing much fiber need long boiling to soften them and separate the cellulose. Young, green vegetables contain less fiber and require less time in cooking.

Bearing all the above in mind, the following tables may serve as a general guide for beginners. When it is possible to do so, TEST.

TIME TABLE.

BOILING

Meats (4 to 5 lbs.)—2 to 5 hours. (Tough meats should be kept below boiling, 180° F.)
Fish (2 to 5 lbs.)—30 to 45 minutes.
Ham (12 to 14 lbs.)—4 to 5 hours.
Corned Meat (6 to 8 lbs.)—4 to 6 hours.
Potatoes, white—20 to 30 minutes.
Potatoes, sweet—15 to 25 minutes.
Peas, green—20 to 60 minutes.
Beans, string—½ to 1 hour.
Beets, young—45 minutes.
Beets, old—3 or 4 hours.
Onions—40 to 60 minutes.
Cauliflower—20 to 25 minutes.
Cabbage, cut up—20 to 25 minutes.
Turnips, parsnips—30 to 45 minutes.
Carrots—1 hour; less if young.
Green corn—8 to 15 minutes.
Spinach—15 to 20 minutes.
Squash—20 to 30 minutes.
Asparagus—20 to 30 minutes.
Diced Vegetables—10 to 20 minutes.

BAKING

Beef rib (medium, 4 lbs.)—1 hour, 15 min.
Beef rib (medium, 8 lbs.)—2 hours, 15 min.
Leg of lamb—1 hour, 30 minutes.
Pork (rib)—3 to 4 hours.
Veal (leg)—3 to 4 hours.
Chicken (3 to 4 lbs.)—1 to 1½ hours.
Turkey (8 to 10 lbs.)—2 to 3 hours.
Fish (3 to 4 lbs.)—45 to 60 minutes.
Braised beef—4 to 5 hours.
Bread, white—45 to 60 min. depending on shape of loaf.
Bread, Graham—35 to 45 minutes.
Quick Doughs—8 to 15 minutes.
Cookies—8 to 10 minutes.
Cake, thin—15 to 30 minutes.
Cake, loaf—40 to 60 minutes.
Pudding, Indian, etc.—3 hours or more.
Bread Pudding—20 to 45 min., depending on shape and number of eggs.
Pies—30 to 45 minutes.
Scalloped Dishes—15 to 20 min.
Baked Beans—12 hours or longer.

OVEN TEMPERATURES.

	ENTER AT	KEEP AT
Roast Meats	480° F.	350° F.
Fish	425° F.	350° F.
Bread	440° F.	400° F.
Popovers	480° F.	450° F.
Cookies, Puff Paste	480° F.	450° F.
Quick Doughs	480° F.	480° F.
Ginger Bread and Molasses Mixture	380° F.	380° F.
Plain Cake	380° F.	380° F.
Sponge Cake	350° F.	340° F.
Baked Custard	350° F.	Higher in water

These temperatures are for gas ovens, with thermometer through the top. An oven door "thermostat" should register from 50° to 70° less. Few of these are accurate in their readings, but after being tested a few times they are useful in obtaining desired temperatures thereafter.

In addition to the methods of processes of applying heat, there are a few fundamental processes in cooking, i. e., thickening, leavening, shortening and flavoring.

THICKENING AGENTS

The common thickening agents are flour, corn starch, rice flour, potato flour, arrow root, eggs; also gelatin, sea moss, junket for milk, and pectin of unripe fruits stiffen liquids on cooling.

Proportions

One level tablespoon of flour will thicken one cup of liquid for soups.

Two level tablespoons of flour will thicken one cup of drippings or other liquid for gravies and sauces.

Five level tablespoons of *browned* flour will thicken one cup of liquid for gravy.

The thickening power of corn starch is about twice that of flour.

Four level tablespoons of corn starch will stiffen about one pint of liquid, as in corn starch pudding.

Two good sized eggs to one pint of milk make a custard—one egg to a cup for soft custard or baked cup custard; three eggs to a pint of milk for a large mold custard.

One level tablespoon of granulated gelatin will stiffen about one pint of liquid, if cooled on ice.

LEAVENING AGENTS

Doughs are made light or porous in the following ways:

(a) By the production (and expansion by heat) of carbon dioxide gas from the combination of baking soda with some acid substance.

(b) From carbon dioxide gas produced by the growth of yeast—a microscopic plant.

(c) From the expansion of entangled air, incorporated in the dough by means of (1) beating batters; (2) folding thick doughs; (3) beating air into eggs, especially the whites—then folding them into the mixture.

(d) From the expansion of water to steam.

Proportions

Use two level teaspoons baking powder to one cup of flour.

Use one teaspoon less of baking powder for each egg added after two have been used.

Use one-half teaspoon soda with one and a quarter teaspoon cream of tartar.

Use one-half teaspoon soda with one cup sour milk.

Use one-half teaspoon soda with one cup molasses.

Two teaspoons baking powder are equivalent to one-half teaspoon soda in the above combinations.

The yeast plant grows best at 75 to 90 degrees F. It changes *sugar* into alcohol and carbon dioxide gas. Flour contains a small proportion of sugar and during bread making some of the starch is changed into sugar, but the yeast begins to act more quickly if a little sugar or glucose is added at first. Salt and fats in quantity hinder the growth of the yeast. Low temperatures stop the growth almost completely; high temperatures kill the plant.

When eggs are used as leavening agents, the whites are beaten separately, as they will hold much more air than the yolks, and folded into the mixture the last thing, breaking as few air cells as possible.

When air is depended on for leavening agent, all materials are kept as cold as possible. Cold air expands more on heating than warm air. In pastry making, heat also melts the fat, so that the dough cannot be handled.

SHORTENING

Fats are added to doughs to make the product brittle—friable—"short," and to enrich the mixture. The fat counteracts the adhesive properties of the gluten and starch in flour.

Pastry flours contain less gluten than bread flours and so require less shortening.

Butter and oleomargarine contain about one-eighth water and salt, and thus have less shortening powers than lard, drippings, snowdrift, cottolene, etc., which contain no water.

Proportions

Two cups of flour (eight ounces) made into puff paste requires eight ounces (one cup) of shortening.

Two cups of flour in ordinary pie crust requires four ounces (one-half cup) of shortening.

Two cups of flour in cookies requires four ounces (one-half cup) of shortening, or less.

Two cups of flour in cake requires about three ounces of shortening.

Two cups of flour in short cake requires two ounces (one-fourth cup) of shortening, or more.

Two cups of flour in tea biscuits requires one-half to one ounce (one to two tablespoons) or more of shortening.

In yeast doughs less shortening is used—from one-half to an ounce to two cups of flour. The tenacity of the gluten is required to hold the carbon dioxide gas slowly formed by the yeast, hence too much shortening prevents proper rising.

Shortening for batters may be *melted* and mixed in, but in doughs which are to be rolled—pastry, cookies, short cake, biscuit, etc.—the fat should be *cold* and hard and cut into the flour with a knife, or rubbed in with the tips of the fingers.

FLAVORING

The flavoring materials most commonly used are salt, sugar, spices and extracts. The fine art of cookery consists of developing the full natural flavor of the foods themselves and in combining them in pleasing ways.

The amount of salt to be used depends, in general, on the *total volume* of the food. When food tastes salty, too much has been used. A safe proportion is one teaspoon salt to one quart of liquid in soups, sauces, or to one quart of flour in doughs, and for cereals one teaspoon to each pint of water used. When the flavors are delicate, somewhat less salt is used, and with strong flavors, somewhat more. Cakes in which much salt butter is used do not need more salt.

The quantity of sugar to be used depends on the taste desired. Foods served frozen need more sweetening than when at ordinary temperatures. On the other hand, foods that are served warm taste somewhat sweeter than when at ordinary temperature.

RECIPES

The following recipes were furnished by Miss Anna Barrows, teacher of cookery, Columbia University, author of *Principles of Cookery,* or adapted by the editor from the various standard recipes used in cooking schools:

WATER: EXTRACTING FLAVOR.

Tea.

Heat an earthenware teapot with hot water. Empty it and put in one teaspoon of tea for each measuring cup of fresh *boiling* water. Let it stand in a warm place two or three minutes. Strain and serve at once. If the tea boils or stands too long with the leaves it is unfit to drink.

Coffee.

Use one-fourth cup of coffee for one pint of water. Place fine ground coffee in strainer in the coffee pot; add actually boiling water *slowly,* a spoonful or two at a time. Cover between additions Pour through a second time if desired stronger.

Or: Mix one-fourth cup coffee and one teaspoon beaten egg with a little cold water, add the remainder of one pint of water boiling hot. Let it boil up, pour from the spout and turn back into the pot and leave for ten minutes where it will keep hot but not boil.

Stock.

Stock is the basis for all soups, except milk or cream soups, to which it is sometimes added. From a pint to a quart of cold salted water is used to each pound of meat and bone, both of which should be in small pieces. Let stand one hour, heat slowly and simmer gently for four hours or more, strain and cool quickly. Remove the hardened fat before using. About a cup of mixed vegetables—carrot, onion, parsley, celery, etc.—may be added during the last hour. Mixed herbs and spices, as bay-leaf, blade of mace, two or three cloves and pepper corns, may be tied in cheese cloth and removed from the liquor when sufficient flavor has been extracted.

Bouillon—usually made from beef with little bone and no vegetables. Brown Stock—some of the meat and a part of the vegetables browned in hot fat or marrow. White Stock—made from chicken, veal, or fish; no flavoring which gives color added. Macaroni, Vermicelli, Noodle, Rice, Barley Soup and the like—cook about one-fourth cup of dry material until tender and add a quart of hot stock, or use cooked left-overs. Julienne Soup—one-half cup mixed cooked vegetables cut in cubes, strips or fancy shapes, to one quart of stock.

RESTORING WATER.

Dried Fruits and Vegetables.

Pick over, cover with cold water, leave for half an hour, then wash thoroughly, inspecting each portion and drain. Again cover with cold water and soak 12 to 24 hours, and then cook slowly until tender. Add sugar if desired for sauce when nearly done, or use like fresh fruit for pies, short-cake, etc.

Prunes, apricots, peaches, apples, pears and vegetables are treated in this way.

THICKENING.

Sauces.

Methods of mixing: (1) Melt butter (or other fat) in saucepan, stir in dry flour, cook and stir until frothy all over, then add liquid slowly, hot or cold, while stirring; cook again until thick, stirring until smooth.

(2) Rub butter and flour together and stir into the warm liquid in a double boiler, then cook and stir until thick and smooth.

(3) When cream or less butter is used, rub the flour smoothly with a little cold liquid and stir into the remainder, which should be hot, and cook in double boiler until smooth. Then add butter and seasoning.

Thin Sauce: One level tablespoon fat, one tablespoon flour and one cup liquid, one-fourth teaspoon salt, few grains pepper (white).

Suitable for creamed potatoes, macaroni, toast, etc.

Medium Sauce: Two tablespoons fat, two tablespoons flour and one cup of liquid. Seasoning.

For general use with fish and vegetables.

Thick Sauce: Two to four tablespoons of fat and three or four of flour for each cup of liquid, either milk or milk and stock.

This is the basis of souffles and croquettes.

White Sauce may be varied by different flavors and garnishes, such as capers, celery, mushrooms, oysters, lobsters, etc., etc.

Tomato for the liquid in sauce may be seasoned with onion, herbs and spices, by cooking them with it for a short time before straining.

Spanish Sauce is tomato sauce with the addition of onion and peppers.

Dutch or Hollandaise Sauce: To one cup white or milk sauce add one or two beaten egg yolks and cook in double boiler like custard. Flavor with one tablespoon lemon juice.

Brown Sauce for Roast or Pan Broiled Meats: After placing the meat on the platter drain out any fat in the pan and put some water to soak off the browned juice and flour.

For each cup of gravy put two tablespoons of the fat in a saucepan and brown two tablespoons of flour in it; then add one cup of the water from the pan. Cook like white sauce. Season as desired with salt and pepper.

Or, Melt and brown two tablespoons of butter in a saucepan; add two or three tablespoons of flour and continue the browning. When coffee color, add one cup water or stock or milk.

Welsh Rarebit.

Heat one-half cup of cream in the blazier of a chafing dish or in a skillet, add one tablespoon of butter creamed with one teaspoon of corn-starch, one-fourth teaspoon of salt, and a few grains of cayenne. When thick, set over the hot water or heat very slowly and add one-half pound of soft mild cheese cut up fine and one-half teaspoon of mushroom ket-

chup or Worcestershire sauce or one-fourth teaspoon of mustard. Stir until the cheese is melted and pour over crackers or thin toast.

Cream Soups.

Cook the vegetable till soft and rub through a strainer, using all or a part of the water in which the vegetable is cooked, except with potatoes. Combine with an equal quantity of white sauce or white stock or mixture of the two. Season. If too thick, add hot milk. Beaten egg may be added just before serving if too thin.

Asparagus, Carrots, Cauliflower, Celery, Corn, Cucumbers, Lettuce, Mushrooms, Onions, Spinach, Summer Squash, Turnips, Water Cress.

CREAM OF PEAS, BEANS, LENTIL, POTATO and other thick soups have half quantity or less of white sauce added to keep the materials from settling.

CREAM OF CHICKEN, FISH, etc., made of stock from bone, skin and other inedible portions combined with about equal quantities of hot white sauce seasoned in various ways.

Corn Starch Blanc Mange.

Blend two tablespoons cornstarch with an equal bulk of milk, heat remainder of one cup milk in double boiler. Stir the hot milk into the moistened starch, return to double boiler, stir on stove till thick, put over water, cover and cook twenty to thirty minutes or longer. Add two tablespoons sugar, a bit of salt, flavor and put in moulds.

VARIATIONS: For liquid use part thin cream and part strong coffee, or all fruit juice.

Put layers of raw or cooked fruit alternately with the blanc mange in the moulds.

Blend two tablespoons of cocoa with the sugar before it is added to the cornstarch mixture.

Irish Moss Blanc Mange.

To soften the moss, soak one-half cup in cold water, wash pick over and cook in one pint of water in a double boiler for about half an hour. Strain and make up to a quart with scalded rich milk or thin cream; add a teaspoon of extract

flavoring and one-fourth teaspoon of salt. *Or* cook the softened moss directly in one quart of milk, season and strain. Put in molds.

Use of Gelatine.

One level tablespoon granulated gelatine will stiffen about one pint liquid. Different makes of sheet, shredded, granulated and powdered gelatine may be used interchangeably by weight. A larger proportion of gelatine is required for large moulds than for small. A little salt improves most gelatine combinations.

Soak gelatine in cold water until soft, dissolve by adding boiling liquid, sweeten and flavor with coffee, lemon, or other fruit juices and pulp. Keep the proportions of gelatine and total liquid right. A little more gelatine is required in hot weather, unless ice is used.

Such jellies may be served with whipped cream or boiled custard. Every package of gelatine is accompanied with directions for its use.

Fruit Pudding.

Make a jelly flavored with fruit juice, slightly increasing the proportion of gelatine. As it begins to stiffen, combine nearly an equal amount of fruit with it. With each half cup of jelly may be used one date, one-half fig, two or three almonds, one-fourth orange, one-fourth banana, etc.

Snow Pudding or Fruit Sponge.

Beat one egg stiff and add one cup half stiffened jelly gradually. Or, beat the jelly till frothing and blend the stiff egg with that. Mould and chill. Serve with soft custard sauce made of the egg yolks.

Bavarian Cream.

Stiffen a soft custard, or fruit juice, or combination of the two, with gelatine. As it begins to stiffen, fold in stiff whipped cream.

Baked Custards.

Scald one pint milk. Beat two eggs till smooth, add one-fourth cup sugar, a bit of salt, and blend with the hot milk. Strain into buttered molds, set in a pan of hot water

and bake until firm. Put a thin knife blade in center of custard and if done no milk will adhere to the blade as it is removed.

The same proportions may be used for custard pies, or may be combined with cooked rice for a pudding.

Soft Custard.

Use the same proportions as for baked custards, or three egg yolks in place of two whole eggs. Pour hot milk over the beaten eggs, stirring constantly. Sugar may be added before or after cooking the custard.

Return milk and egg to the double boiler and cook, stirring all the time until the custard thickens and coats the spoon, three minutes or longer. If cooked too long the custard will curdle. Cool quickly. Flavor before serving.

Egg Timbals.

Use only one-fourth to one-half cup liquid, milk or stock, for each egg. Flavor with salt, pepper, etc. Cook like custards, turn from mold and serve hot with tomato sauce.

Thickened Custards.

Filling for Cream Puffs, Layer Cake, Sauces, Ices, etc.

Make a smooth paste with one-fourth cup flour and a little milk and scald the remainder of one pint of milk. When it is hot, blend carefully with the flour and cook in a double boiler twenty minutes or more. Then combine with the beaten yolks of two or three eggs and stir steadily while cooking three to five minutes longer. Take from the fire and sweeten and flavor according to its use. For filling for a layer cake one-fourth cup sugar may serve, while for cream puffs one-half cup or more will be needed.

The same foundation may be combined with an equal quantity of cream or of fruit juice, or of each, made very sweet and frozen as ice cream.

Frozen Desserts—General Directions.

All mixtures must be sweeter and more highly flavored than if served without freezing. Cool thoroughly before packing in ice and salt. Use three measures fine cracked ice to one measure of salt.

Lemon Ice.

Mix in proportion of the juice of one lemon, one-fourth cup of sugar and one cup of water. *Or,* make a quantity of syrup, 4 measures of sugar to 2 of water, and use 4 measures of syrup to 1 of fruit juice. Strain into a tin can or straight glass jar with a close cover. Pack this in a pail or pan with ice (or snow) and salt. Turn the can around and occasionally scrape down the ice which forms inside. Use other fruit juices in the same way—orange, pineapple, raspberry—to which lemon juice is usually added, grape juice or acid jelly.

Pineapple Sherbet.

One can of grated pineapple, one cup of sugar, juice of two lemons, one tablespoon of powdered gelatine, one quart of water or milk.

Ice Cream.

Scald thin cream in double boiler, dissolve sugar in the proportion of one cup to a quart, add flavoring when cool—extract, one tablespoon to a quart. This is "Philadelphia" ice cream. Thickened custard made very sweet and highly flavored is often called "New York" ice cream.

Mousse or Parfait.

Mix together one cup thick cream, two tablespoons powdered sugar and flavoring. Whip cream with egg beater, skimming off froth as it rises and draining on a sieve. Return liquid to bowl and whip until no more froth will rise. Turn drained froth into a mould; cover, and bind the lid with a strip of muslin dipped into melted fat. Bury in ice and salt for three to four hours before serving.

Junket.

The active principle in junket is rennin or "rennet," which is extracted from the lining of calf's stomach. This will coagulate or thicken warm milk but nothing else. Its properties are destroyed at the boiling temperature and it has no action in the cold. Heat two cups of milk to body temperature, 99 degrees, powder junket tablet and dissolve in a little water, add one-third cup of sugar dissolved in one-

third cup of warm water and flavoring extract. Pour into serving dishes and keep warm until set. Cool.

Caramel syrup or maple syrup may be used in place of sugar. Chocolate may be added or beaten egg yolks with beaten whites on top.

Jellies.

Pectin is the gelatinizing agent in jellies and jams. It is a substance similar to starch and is found in most fruits and some vegetables. It is most abundant when fruit is just ripe or nearly so. The making of good jelly depends on having the correct proportion of fruit juice, sugar, and *acid* and on boiling. The density of the mixture should be between 24 degrees and 30 degrees as measured by the syrup gage at the boiling temperature, and the boiling point 217 degrees F. or 103 degrees C. Long boiling alters the gelatinizing properties of pectin. Too great a proportion of sugar and violent boiling cause the sugar to crystallize in the jelly.

Pick over and clean, or pare, core and cut up large fruits, heat with or without water and cook until very soft. Juicy fruits like currants and grapes need no added water, while fruits like apples should be barely covered with water. Strain the juice from the pulp through cheese-cloth or flannel. To the strained juice granulated sugar is added usually in the proportion of pint to pint, but good jelly may be made with half the volume of sugar to juice. The proportion depends on the acid and sugar in the fruit. Heat slowly to dissolve sugar, and boil gently until proper density is obtained, skimming froth that rises. If no syrup gauge is used, test by dropping a little on a cold plate to see if the jellying point is reached. Pour into sterilized glasses and when set cover with melted paraffine.

The pulp may be squeezed in the straining bag to get a marmalade or even a second quality jelly: or, better, heat pulp again with a small amount of water and strain without pressure. This process may be repeated. Boil down somewhat and add sugar and finish as before. Jelly may be made from parings and cores.

As the presence of acid is essential to make the materials jelly, lemon or currant juice is usually added to sweet flavored

fruits. (Summary of the result of experiments made by Dr. Goldthwaite at University of Illinois and Miss Snow at University of Chicago).

Soft Cooked Eggs.

Place eggs in one cup of boiling water to each egg in a saucepan, cover and remove from the fire.

From five to ten minutes will be required according to the firmness desired.

Or, put one egg in one cup of cold water and bring slowly to the boiling point. Then remove the egg.

Hard Cooked Eggs.

Keep eggs in water just below the boiling point for thirty minutes. The yolks should be dry enough to mash easily. Such eggs are suitable for salads—may be warmed in any well flavored sauce, may be stuffed by blending the yolks with chopped meat or nuts or seasoning of any kind.

THICKENING AND LEAVENING.

Omelets.

There are but two types of omelet to which special names are given from the garnish added.

French Omelet.

Beat an egg slightly. Add one tablespoon water or milk, season with salt and a dash of pepper. Turn into a hot buttered frying pan, which must be perfectly clean and smooth. Lift cooked portions with a fork. Shake the pan to prevent adhesion. When all is firm, fold and serve at once.

Puffy Omelet.

Separate white and yolk of one egg. Beat white stiff, add yolk and blend together. Add salt, pepper and one tablespoon of water or milk. Turn into buttered pan and place where it will cook slowly and evenly. When firm, fold and serve.

Two tablespoons of white sauce or bread softened in milk may be used instead of one of milk or water. Chopped parsley, or other vegetable, any nice bits of meat or fish, cheese, jelly, etc., may be folded into the omelet just before serving.

Meringues or Kisses.

Beat egg whites with a speck of cream of tartar. When stiff fold in one-fourth cup powdered sugar for each white. Flavor slightly, drop on ungreased paper, and bake slowly until dry, thirty minutes or more.

For soft meringues on puddings, use half as much sugar.

Fruit Souffles.

For each stiffly beaten egg white fold in one-fourth cup thick, sweetened fruit pulp, or marmalade, or jam. Partly fill buttered molds, and bake like custards, until firm.

Serve with soft custard as a sauce.

Sponge Cakes.

Equal measures of eggs, sugar and flour, or the weight of the eggs in sugar, and half of the weight of the eggs in flour. This also applies to the use of egg whites only as in angel cakes.

In other words, two large or three small eggs rightly blended with one-half cup each of sugar and flour and carefully flavored and baked slowly will produce such a cake as that shown on page 65.

The yolks of the eggs should be beaten until thicker and lighter colored than when beginning the process. To them add the sugar, one or two teaspoons of lemon juice and a bit of grated rind. Over the whites of the eggs sprinkle a bit of salt and beat until stiff. Fold them into the yolks and gradually sift the half cup of flour over, blending carefully without stirring. Put into the pans and bake in a gentle heat for twenty minutes, if in small cakes; twice as long if in one mass.

Cream Puffs.

In a saucepan heat one-half cup water with two ounces of butter or less. When boiling hot mix in one-half cup of flour and continue to stir while it cooks into a smooth mass. Cool till it will not cook eggs and mix in one egg and a second and beat the whole vigorously with the spoon. Shape on greased pan some distance from each other in six to twelve mounds and bake about thirty minutes according to the size. They should be light and dry when taken from the pan, otherwise they will shrink and be heavy.

QUICK DOUGHS—GENERAL PROPORTIONS.

	Flour	Baking Powder	Liquid	Short-ening	Sugar	Eggs
Pop Overs.....	1 cup	.....	1 cup	.....	.....	1
Timbale Cases...	1 cup	.....	½ cup	1 tbs.	1 tsp.	1 or 2
Griddle Cakes...	1 pint	3 tsp.	2 cups	2 tbs.	1 tbs.	1 or 2
Muffins.....	1 pint	4 tsp.	1 cup	1 tbs.	.....	.....
Muffins (richer).	1 pint	2 or 3 tsp.	¾ cup	1 or 2 oz.	¼ cup	1 or 2
Cake.....	1½ cups	2 tsp.	½ cup	2 oz.+	¾ cup	1 or 2
Doughnuts.....	1 pint	2 tsp.—	½ cup	.....	½ cup	1
Cookies.....	1 pint +	2 tsp.	¼ cup	2 oz.	½ cup	½ to 1
Tea Biscuit.....	1 pint	3 tsp.	⅔ cup	½ oz.+	.....	.....
Shortcake.....	1 pint	3 tsp.	⅔ cup	2 oz.	.....	.....
Pastry.....	1 pint	.....	½ cup	4 oz.	.....	.....

Biscuit.

Two cups sifted flour, three teaspoons of baking powder, one-half teaspoon of salt; sift together, rub in one tablespoon of shortening—butter, oleo, lard or drippings. Mix as soft as can be handled with about two-thirds cup of milk or water. Turn onto a floured board, roll gently to three quarters inch thick, cut and bake. Pastry flour makes more delicate biscuit than bread flour.

DUMPLINGS FOR STEWS: Omit shortening, add milk until dough may be dropped from the spoon into boiling stew. Cover and cook rapidly 10 minutes.

SHORTCAKE: Rub in one-fourth cup of butter in biscuit mixture. Cut like biscuit for individual shortcakes or use a square pan and divide with knife dipped in melted butter so that portions may separate readily after baking.

Use shortcake mixture for covering to meat pies, apple dumplings, etc.

Muffins.

Sift together two cups of sifted flour, two teaspoons of baking powder, one-half teaspoon of salt, and one-half tablespoon of sugar, add one tablespoon of melted shortening, one beaten egg and one cup of milk. Mix thoroughly and bake in quick oven.

BLUEBERRY MUFFINS: Use a little less milk in muffin mixture and add one cup of blueberries and a little more sugar. Chopped apples or other fruit may be used in same way.

TEA MUFFINS: Use one-fourth cup each of sugar and shortening and two or three eggs in the muffin mixture.

Graham Drop Cakes.

Sift together one and one-half cups of graham meal, one-half teaspoon each of salt and soda, one-fourth cup of brown sugar. Mix into a stiff batter with one scant cup of sour milk. Drop from spoon on buttered pan, or into gem pans and bake in a quick oven 15 minutes.

Cereal Gems.

Use even quantities of flour and softened cooked breakfast food, one teaspoon of baking powder to a cup of material, add sufficient milk to make a batter which will drop from the spoon. Mix thoroughly and bake in hot buttered gem pans.

Boston Brown Bread.

Sift together one cup of cornmeal, one cup of rye meal, or entire wheat flour, one teaspoon of soda, one-half teaspoon salt. Mix with one-half cup molasses and one cup sour milk. If not soft enough to smooth out in the bowl, add a little water. Put in greased tins with tight cover and steam three hours or more.

Corn Cake.

Sift together three-quarter cups each of cornmeal and flour, one-half teaspoon each of salt and soda, one tablespoon of sugar. Mix with one beaten egg and one cup of thick sour milk or cream. Bake in muffin pans or single pan, twenty to thirty minutes, according to thickness.

The cornmeal may be scalded with an equal volume of boiling water, left to cool, or over night, and more shortening, two eggs and a little sugar may be added.

Griddle Cakes.

Into one pint of sifted flour mix one-half teaspoon of salt, three teaspoons of baking powder and one teaspoon of sugar. Beat two eggs until very light, turn into one cup of milk without stirring, add the mixture to the flour with two tablespoonsful of melted butter; beat well, and add more milk to make a batter about like thick cream. Beat vigorously, especially before each frying.

Fry on hot griddle, grease with rind of pork or ham. Drop batter from end of the spoon, making circular cakes. Turn when full of bubbles.

Waffles.

Are cooked on a waffle iron, using the griddle cake mixture.

Plain Cake ("Lightning" Cake).

Place the flour sifter in the mixing bowl and put in it one and one-half cups of flour, three-fourths cup of fine granulated sugar, two level teaspoons of baking powder, one-half teaspoon of salt. Sift into the bowl.

In the measuring cup, melt one-fourth cup of butter (or oleo), break in two eggs, fill up the cup with milk. Add one-half teaspoon flavoring extract or saltspoon of spice. Mix with the dry ingredients and beat well two or three minutes. Bake in sheet or greased muffin tins in quick oven.

VARIATIONS: Add two tablespoons of cocoa, or an ounce of melted chocolate. Use one cup caramel or maple syrup in place of sugar. Leave out part of the sugar for Cottage Pudding.

Cookies.

Rub one-half cup of butter until creamy, gradually add one cup of sugar, then put in one egg and beat together thoroughly. Next add, alternately, one-half cup of milk or water and one pint of flour, in which two teaspoons of baking powder have been sifted. Use enough more flour to make a soft dough, from one to two cupfuls, according to the nature of the flour, roll out thin, cut with a cookie cutter or in fancy shapes, and bake in a quick oven.

VARIATIONS: Before all the flour is added, divide into four portions; to one add one teaspoon of lemon extract, to another one-half cup of desiccated cocoanut; one-half ounce of chocolate melted, or a teaspoon of cocoa, sifted in with a little flour; to the fourth, one teaspoon of mixed spice and one-half cup of chopped raisins, etc. Or flavor the portions with ginger, almond with chopped almonds on top, or with dates, figs, nuts. Or use less flour and drop from a spoon for a soft thick cake.

Gingerbread.

Sift together two cups of flour, one-half teaspoon each of salt and soda and one teaspoon of ginger. Mix with one cup of molasses and two tablespoons of fat softened in one-half cup of hot water. Bake twenty minutes or more in a moderate oven.

Cereal Gems.

Use even quantities of flour and softened cooked breakfast food, one teaspoon of baking powder to a cup of material, add sufficient milk to make a batter which will drop from the spoon. Mix thoroughly and bake in hot buttered gem pans.

Boston Brown Bread.

Sift together one cup of cornmeal, one cup of rye meal, or entire wheat flour, one teaspoon of soda, one-half teaspoon salt. Mix with one-half cup molasses and one cup sour milk. If not soft enough to smooth out in the bowl, add a little water. Put in greased tins with tight cover and steam three hours or more.

Corn Cake.

Sift together three-quarter cups each of cornmeal and flour, one-half teaspoon each of salt and soda, one tablespoon of sugar. Mix with one beaten egg and one cup of thick sour milk or cream. Bake in muffin pans or single pan, twenty to thirty minutes, according to thickness.

The cornmeal may be scalded with an equal volume of boiling water, left to cool, or over night, and more shortening, two eggs and a little sugar may be added.

Griddle Cakes.

Into one pint of sifted flour mix one-half teaspoon of salt, three teaspoons of baking powder and one teaspoon of sugar. Beat two eggs until very light, turn into one cup of milk without stirring, add the mixture to the flour with two tablespoonsful of melted butter; beat well, and add more milk to make a batter about like thick cream. Beat vigorously, especially before each frying.

Fry on hot griddle, grease with rind of pork or ham. Drop batter from end of the spoon, making circular cakes. Turn when full of bubbles.

Waffles.

Are cooked on a waffle iron, using the griddle cake mixture.

Plain Cake ("Lightning" Cake).

Place the flour sifter in the mixing bowl and put in it one and one-half cups of flour, three-fourths cup of fine granulated sugar, two level teaspoons of baking powder, one-half teaspoon of salt. Sift into the bowl.

In the measuring cup, melt one-fourth cup of butter (or oleo), break in two eggs, fill up the cup with milk. Add one-half teaspoon flavoring extract or saltspoon of spice. Mix with the dry ingredients and beat well two or three minutes. Bake in sheet or greased muffin tins in quick oven.

VARIATIONS: Add two tablespoons of cocoa, or an ounce of melted chocolate. Use one cup caramel or maple syrup in place of sugar. Leave out part of the sugar for Cottage Pudding.

Cookies.

Rub one-half cup of butter until creamy, gradually add one cup of sugar, then put in one egg and beat together thoroughly. Next add, alternately, one-half cup of milk or water and one pint of flour, in which two teaspoons of baking powder have been sifted. Use enough more flour to make a soft dough, from one to two cupfuls, according to the nature of the flour, roll out thin, cut with a cookie cutter or in fancy shapes, and bake in a quick oven.

VARIATIONS: Before all the flour is added, divide into four portions; to one add one teaspoon of lemon extract, to another one-half cup of desiccated cocoanut; one-half ounce of chocolate melted, or a teaspoon of cocoa, sifted in with a little flour; to the fourth, one teaspoon of mixed spice and one-half cup of chopped raisins, etc. Or flavor the portions with ginger, almond with chopped almonds on top, or with dates, figs, nuts. Or use less flour and drop from a spoon for a soft thick cake.

Gingerbread.

Sift together two cups of flour, one-half teaspoon each of salt and soda and one teaspoon of ginger. Mix with one cup of molasses and two tablespoons of fat softened in one-half cup of hot water. Bake twenty minutes or more in a moderate oven.

Doughnuts.

Sift together four cups of flour, one teaspoon of salt, three teaspoons of baking powder, one-half teaspoon of mixed spice and one cup of sugar. Mix with one egg and one cup of milk.

Sour milk and soda may be used in place of baking powder. For richer doughnuts, two eggs and one tablespoon of butter may be used.

Plain Pastry.

Sift two cups of flour with one-half teaspoon of salt and cut in with a knife, one-fourth cup or two ounces of shortening. Mix with about one-half cup of ice water into a stiff dough. Roll out and spread with one ounce of butter, fold and add a second ounce of butter in the same way, making one-half cup of shortening in all. For upper crusts more shortening may be rolled in if desired. Keep everything as cool as possible. The lightness of the pastry depends on the amount and coolness of the air enclosed and the flakiness on the number of layers of fat and dough produced by folding and rolling.

YEAST DOUGHS—GENERAL PROPORTIONS.

	Sugar	Shortening	Liquid	Yeast Cake	Flour	Eggs
Bread.....	1 tsp.	½ oz. +	1 cup	¼ to 1	3 cups	....
Muffins....	1 tbs.	½ oz.	1 cup	¼ to 1	2 cups	1 +
Rolls.....	1 tbs.	1 oz.	1 cup	¼ to 1	3 cups	....
Fancy Rolls.	2 tbs.	2 oz.	1 cup	¼ to 1	3 cups +	1 +
Buns.....	½ cup	2 oz.	1 cup	¼ to 1	3 cups +	....
Coffee Cake	¼ cup	2 oz.	½ cup	¼ to 1	2 cups	2 +

Bread—For Each Loaf—Short Process.

One cup of scalded milk, or half milk and half water, one-half teaspoon each of salt and sugar, from one-fourth to one whole cake of yeast according to time, softened in lukewarm water, and about three cups of bread flour. Mix thoroughly and knead until the dough is smooth and springy. The dough should be warm. Let rise till double, shape, put in pan, rise again and bake. If preferred, shape into a dozen to two dozen rolls.

Entire Wheat Bread.

Scald one cup of milk; in it melt one teaspoon of butter and half a teaspoon each of sugar and salt. When lukewarm, add half a cake of compressed yeast, softened in one-fourth cup of warm water. Stir in between two and three cups of flour to make a dough stiff enough to hold its shape. Mix thoroughly with a knife, but do not knead it until after it has risen to double its bulk, then shape into small loaves, let rise until double in size, bake in hot oven about half an hour.

One-fourth cup of molasses may be used in place of the sugar if preferred.

Rolls—Long Process.

In a bowl put one tablespoon of butter or lard, one tablespoon of sugar, one teaspoon of salt, and one pint of scalding hot milk. When cool, add one-quarter yeast cake softened in a little water, and three cups of flour. In the morning, or when light, add to this sponge about three cups more of flour, or enough to knead. Let rise till double in bulk, then shape, put in pans, rise again, and bake.

MUFFINS: Add two or three eggs to the sponge, but no more flour. Bake in muffin pans.

Coffee Cake.

Work into one pint of light dough, two-thirds cup of white sugar, one egg, and two ounces of melted butter. Mix thoroughly to a creamy, smooth batter by beating.

Pour into shallow pan and let rise again. Sift sugar and cinnamon over the top and bake in a quick oven. Serve warm.

Use of Stale Bread.

Bread Cases.

Cut slices of bread two inches thick and three inches long. Remove part of crumbs from the center, leaving a hollow space. Spread with butter and brown in the oven.

Croutons.

Cut stale bread into slices about one-third inch thick and then in cubes. Bake in moderate oven until golden brown.

Dry Crumbs.

Crusts remaining from croutons, etc., should be dried in the oven, rolled and sifted, the fine ones used for croquettes, etc., the coarser for stuffing or escalloped dishes.

Cracker crumbs may be used in the same way.

Buttered Crumbs.

Melt butter and stir in crumbs till the butter is evenly distributed.

One ounce of butter for one cup of crumbs is a fair proportion. Buttered crumbs seasoned and moistened are used for stuffing peppers, tomatoes, fish, poultry, etc.

Filling for Fish or Fowl.

One cup of crumbs will serve for a small fish or chicken, while a large fowl or turkey will require two or three. With each cup of crumbs blend one ounce or more of butter or chopped fat salt pork, one teaspoon parsley or mixed herbs, one-half teaspoon salt and a little pepper. Moisten with milk, water or stock. For fish season also with lemon and onion juice.

Mashed potato or chestnuts may be used instead of crumbs.

Fat—To Try Out and Clarify.

Cut the fat—beef suet or flank fat—in small pieces, removing skin and bits of lean meat. Cover with cold salted water and leave in a cold place for several hours. Drain off the water, and if possible soak again, and drain. Cook slowly in moderate oven or in upper part of the double boiler till the fat has melted and the scraps are crisp, but not brown. Strain and cool. Slices of raw potato or pieces of charcoal cooked in the fat before straining will absorb any impurities.

Beef, pork and chicken fat may be combined. Surplus fat from roast beef, corned beef, etc., may be added.

Such fat may be used for shortening muffins, gingerbread, etc., for greasing pans, for some sauces and soups, or for deep frying. Mutton fat may be prepared to add to fry fat.

Fat from bacon, ham or sausages should be reserved for hashes or warming over potatoes.

MEATS.

Broiled Meats, Chops, Steaks.

The meat should be cut in convenient pieces, and some of the bone, gristle and fat removed. Sections one inch thick will be more juicy than thinner ones. Wipe the meat with a damp cloth, grease the broiler or pan with a piece of the fat, or brush melted fat over the meat. Place the meat where intense heat will reach it at first, under the gas flame, or in a hot pan on top of the stove, or over hot coals. Turn often at first, every half minute if directly over the coals, until well seared and browned on both sides, then move it farther away from the fire so the heat may penetrate to the center without burning the outside.

As the meat is seared on the surface the juices are driven towards the center, and expanding with the heat tend to make the surface of the meat puff outward. This is very apparent between the wires of a double broiler and probably is the best indication that the meat is cooked.

Steaks one inch thick should cook in five or six minutes to be rare, eight or ten minutes to be well done, the time

varying according to the method of cooking and intensity of heat. Mutton chops may be served rare, lamb usually well done, veal and pork always must be thoroughly cooked.

Broiled meats should be served at once on a hot dish and with slight seasoning beside their own juices. If kept hot the cooking is continued too far.

Fish and chicken may be partially broiled and then finished in the oven. Apply the direct heat mainly to the cut inside surface, as the skin burns easily.

Roast Meats.

Trim, wipe, score the fat portion and rub salt into that, place on rack in pan, sprinkle flour all over it, put skin side down. Have oven very hot at first to sear outside quickly to prevent escape of juice, then reduce heat. Baste occasionally as needed with the fat which cooks out into the pan, and turn the roast over to cook it evenly.

If there is danger of burning put some water in the pan after the meat is seared, but this is not necessary if heat of oven is lowered.

A sirloin or rib roast weighing five pounds will require about one hour, or longer, if it is to be well done. A surer rule for time of cooking is to allow fifteen minutes for each inch in thickness, or twenty minutes if wanted well done.

Braised Beef.

Use a thick section of the lower part of the round, two to four pounds. Trim, wipe and sprinkle with flour, season with salt and pepper. Brown under the gas or in hot fat. Put in casserole, partly cover with water or brown or tomato sauce. Cover closely and cook in very slow oven three to five hours.

Meat Stew.

Neck or breast of lamb of veal or inexpensive cuts of beef may be used in this way. Cover bones with cold water and heat slowly. Cut meat in convenient pieces, roll in flour seasoned with salt and pepper. Fry bits of fat, then

brown sections of prepared meat and onion if desired. Put meat in kettle with bones when water is hot.

When nearly tender add carrot, turnip, peppers, or celery cut in small shapes about one cup each to one pound of meat.

Potatoes pared and cut in quarters may be added 20 to 30 minutes before serving, and dumplings 10 minutes before serving.

Escalloped Fish or Meat.

Equal measures of cooked minced meat, bread crumbs and white or tomato sauce; or, for one measure of meat, half as much sauce and one-fourth as much buttered crumbs. (Boiled rice or macaroni may be used instead of crumbs.)

Remove all uneatable portions from meat and mince or chop. Put in layers in a buttered dish, having crumbs for the last. Bake until heated through and brown on top.

Fish or Meat Loaf, or Timbales.

Remove skin, gristle and bone from meat or fish and mince fine. Combine with an equal quantity of bread crumbs or stuffing from a baked fish or roast fowl, season as desired, moisten with milk or stock. Add one beaten egg or more to each pint of the mixture. Pack in buttered moulds, steam or bake until firm in center. Turn out and serve with sauce.

Meat Loaf in Rice.

Line a mould with well-cooked rice. Fill with the meat prepared as above. Cover with rice. Steam an hour. Serve with tomato sauce.

Fish Balls.

In a stew pan put one pint potatoes, pared and quartered, and one cup salt cod fish which has been picked apart in cold water. Cover with boiling water and cook until the potatoes are soft. Drain in a colander till no water can be shaken out. Return to pan, mash thoroughly, add salt if needed, a shake of pepper, one teaspoon butter, one raw egg, and beat all together. Shape on a spoon or in small balls and fry in deep fat, hot enough to brown them in one minute. Drain on soft paper.

CEREALS AND VEGETABLES.

Breakfast Foods.

Usual proportions—one-half cup flakes or one-fourth cup granules to one cup water, one-fourth teaspoon salt to one cup water.

The denser the cereal, the more water and the longer the time required.

Bring water to boiling point in upper part of double boiler, placed directly on the stove.

Pour cereal slowly into boiling water, stirring constantly. Let boiling continue about five minutes till mixture begins to thicken. Place over boiling water in lower part of the boiler. Cover and cook gently with little stirring one hour or more, or till tender and soft. Or put in Fireless Cooker for three hours.

Serve hot, with or without sugar, with milk, cream or butter. Put in moulds with fruit and serve cold as dessert. Pack solidly in loaf shape, slice when cold, brown in hot fat, serve hot.

Corn Meal Mush.

Mix one cup cornmeal, one-fourth cup of flour, one teaspoon salt, one cup cold milk or water. When smooth blend with one pint boiling water, stir for about five minutes. When thick place over water or in steamers and cook one hour or more. Serve hot or pack in pan to fry, or dip in fat and toast under the gas.

Rice.

Pick over and wash thoroughly or parboil five minutes and drain. Then put in a buttered dish with twice its bulk of boiling water and set in a steam cooker. In three-quarters of an hour it should be tender and every kernel distinct, and it may be cooked longer without becoming mushy.

Rice Croquettes.

With one pint of cooked rice (if cold, reheated) blend one tablespoon butter and one or two beaten egg yolks. Season with salt, pepper and parsley, or with sugar and

spice. Divide in ten or twelve portions, press in firm shape, roll in egg and crumbs, and fry in deep fat.

Boston Baked Beans.

Soak one pint beans over night. Parboil in the morning until the skins crack readily with a slight pressure. A very little soda may be put into the water to help this process. Score the rind of one-fourth pound fat salt pork and rinse it. Drain the beans and put part in the bean pot, then the pork and cover with the beans, leaving only a little of the pork rind exposed. Mix one teaspoon of salt, one-fourth teaspoon of mustard and a tablespoon or more of molasses as desired, add water and pour over the beans. Cover and bake twelve hours or more, keeping the beans filled up with water until the last hour, when the cover should be removed and the pork rind and the top layer of beans should brown.

Potatoes.

Baked.

Choose those of equal size and scrub with brush. Cook in hot oven 30 to 40 minutes, or until soft. Then crack the skin to let out steam. The potato should be plump (not shriveled), and the inside white and mealy.

Boiled.

Wash, pare if imperfect or old. If not of uniform size, divide the larger ones. Put in boiling salted water and cook for 20 to 30 minutes, till tender. Drain off the water and shake the uncovered kettle to let the steam escape.

Riced.

Put boiled potatoes through strainer or ricer into a hot dish from which they are to be served.

Mashed.

In a hot pan mash boiled potatoes. For each half pint, add two tablespoons milk, one teaspoon butter, season with salt and pepper.

Croquettes.

Prepare mashed potato with less milk and one egg yolk for each half pint and season with celery salt, paprika and parsley. Roll in crumbs, egg and crumbs, and fry in deep fat.

Stuffed Potatoes.

Cut a slice from end of baked potatoes, scrape out inside, mash and season. Add chopped meat, cheese or parsley for variety. Refill skins and reheat in oven.

Canoes, or Potatoes on the Half Shell.

Cut the potatoes in two lengthwise, refill each part and brown.

Creamed.

Cut boiled potatoes in cubes or slices and reheat in thin white sauce, one-half cup to each cup of potato.

Hash.

Use two parts potato to one part meat, or equal amounts of each. Chop meat, chop or mash potato. Season with salt, pepper, onion, etc., moisten with gravy or water. For one cup hash, put one tablespoon fat in a frying pan. When hot, put in the hash and cook slowly, without stirring, until a brown crust forms on the bottom. Fold like an omelet.

French Hash.

Put meat and gravy in a deep dish, cover with mashed potato and bake till golden brown.

SUGAR.

Caramel.

Put sugar in a smooth iron pan over a hot fire and stir constantly with an old wooden spoon until melted to a light brown syrup. Scrape off any sugar that forms in lumps. When all is melted add an equal amount of boiling water and simmer a few moments until blended into a thick syrup.

A quantity of this may be made at once and kept on hand to flavor and sweeten custards and ice cream, or to serve as a sauce with other puddings.

If it should happen to brown beyond the shade of good maple syrup, let it go a little further until the sweet flavor

would be lost. Then dissolve as above and bottle to use for coloring soups and meat gravies.

Syrup.

Combine equal quantities of water and sugar in a saucepan and stir until dissolved. Boil five to ten minutes until only slightly reduced in quantity. Can while hot in small jars and keep on hand to sweeten fruit drinks or ices as the dissolving of the sugar in cold liquids is a slow and unsatisfactory process.

Fondant.

In an agate saucepan put one cup granulated sugar, about one-sixteenth of a teaspoon of cream of tartar—a bit the size of a small pea—and one-half cup of hot water. Stir till sugar is dissolved, then cover and cook without stirring. Skim and wipe the sides of the pan if necessary. Boil about ten minutes or till 238 to 240 degrees F., when it will form a soft ball in cold water. Turn into a greased bowl or platter and cool slightly. It will grain if stirred while too warm. Beat and knead till a smooth, creamy mass. If it hardens too rapidly dip the hands in water and continue the kneading.

Pack away in covered dish for a day or longer, then shape as desired. Colors and flavors must be very concentrated. By combination with chocolate, dates, figs, nuts, etc., a great variety of candies may be secured. This fondant is a very satisfactory frosting for cake and may be kept on hand. Warm it over water until it can be spread on the cake.

Boiled Frostings.

Cook one cup of sugar with one-half cup of water or less, and a bit of cream of tartar until it will thread, not quite reaching the soft ball stage. Then pour slowly on the stiffly beaten white of one egg and continue beating until cool enough to spread. Much depends on the moisture in the atmosphere as well as the dryness of the cake.

For a still softer frosting a larger proportion of egg white is used. This may be varied with different flavors and colors.

MISCELLANEOUS.

French Dressing for Salads.

One-fourth teaspoon salt, speck pepper, one tablespoon vinegar, two or three tablespoons oil.

Blend thoroughly and pour over the salad.

Mayonnaise Dressing.

One egg yolk, one-half to one cup oil, one tablespoon vinegar, one tablespoon lemon juice, one-half teaspoon salt, one-half teaspoon mustard, few grains cayenne.

Mix vinegar, lemon juice and seasoning.

Beat egg yolk, add oil drop by drop at first, beating continually. When thick add a little of the seasoning mixture, then more oil and alternate until all is used.

Utensils and materials should be kept as cool as possible.

Chocolate.

Melt one ounce chocolate in saucepan over hot water, add a few grains salt, one tablespoon sugar, one-half pint boiling water; stir till smooth; boil one minute. Blend with one pint hot milk and cook in double boiler.

Beat with Dover egg beater to prevent skin forming on top. Just before serving, an egg yolk may be added to the chocolate. Serve with whipped cream.

Chocolate and cocoa both contain starch which requires cooking.

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